DP Benign In Work Place, Study Finds

By Ann Dooley
CW Staff

IRVINE, Calif. — Rather than dehumanizing the white-collar work environment, computer use barely affects workers at all — at least in 42 municipal governments surveyed recently.

When it does affect the work of managers, analysts and clerks, the effects are for the most part positive, according to a study of 1,200 municipal employees conducted by the Public Policy Research Organization at the University of California at Irvine.

The study also found:

- Computers enlarge the scope of workers' jobs without drastically altering their character.
- Computers do increase job pressure by creating new time constraints.
- Computers do not increase supervisory control over an employee's work — a factor often associated with an automated workplace.
- Most survey respondents had little to say either positively or negatively about computing in general, but most expressed strong feelings — mostly negative — about specific incidents related to computer use.
- All the effects were found to increase as contact with computers increased.

The 1,200 individuals surveyed used computer-generated reports in their jobs but did not work directly with a computer system, the report said. They included accountants, manpower analysts and urban planners in the data analysts category; traffic ticket-processing clerks were used to represent clerical jobs, and department heads were selected to illustrate the management group.

In the study, respondents answered questions about the extent to which computer use altered

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Univac Adds Two Rivals For 30 Series

By Tom Henkel
CW Staff

BLUE BELL, Pa. — Univac has added two mid-range CPUs to its 1100/60 line of processors. Called the E series, they are said to be entry-level multiprocessing systems roughly equal in computing power to the IBM 3031 and 3032.

The 1100/62-E1 and 1100/62-E2 are larger than the Univac 1100/61-H1 and H2, but smaller than the 1100/62-H1 and H2 multiprocessors (see chart on Page 4). They were designed for users currently running

(Continued on Page 4)

Intel Couples DBMS, Fast 3805

Data Base Processor Closer to Reality

By E. Drake Lundell Jr.
CW Staff

AUSTIN, Texas — The world of back-end or data base processors came a step closer to reality last week as Intel Corp.'s Commercial Systems Division introduced a Data Base Assist Processor.

The processor was part of a major announcement of "Information Resource Management" hardware and software products from the division, which combines with other parts of Intel's commercial business the data base resources of MRI Systems Corp., acquired last year.

At the time of the acquisition, industry sources speculated that the addition of MRI's software expertise to Intel's semiconductor knowledge would lead to a hardware implementation of a data base processor.

The firm has not gone quite that far at this point, but it has taken a step into the field of "data base hardware," which it claims is "just the tip of the iceberg."

DBMS, Fast 3805 Tied

Intel has integrated certain functions of MRI's System 2000 data base management system (DBMS) — which has been redesigned as the System 2000/80 — with Intel's Fast 3805, a semiconductor replacement for IBM 2305-type fixed-head disk memories announced by the firm at the National Computer Conference last year.

With the Data Base Assist Processor, all pointer tables for the System 2000/80 DBMS are placed on the 3805. The DBMS has been upgraded so it refers all pointer requests to this high-speed memory.

The Fast 3805 has a 1 msec access time. Pointer tables are normally kept on rotating disk along with data tables, but disks like the IBM 3350 have an access time of about 30 msec.

When a request for information comes into the data base, it is directed to the Fast 3805, which provides information to the application on the data table's exact location on the system's rotating disks. This dramatically cuts the time needed to handle such requests, since the request for address locations takes only 1 msec rather than the 30 msec it would take if the request had to be made to the rotating disks.

By placing these pointers on the "semiconductor disk," users can gain a

(Continued on Page 5)

Communications Act Rewrite Stymied

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Efforts to rewrite the Communications Act of 1934 appeared to be at an impasse last week after Rep. Tim Wirth (D-Colo.), a key sponsor of the proposed Communications Act of 1980, charged Rep. Lionel Van Deerlin (D-Calif.) with reneging on a promise to support a key amendment to the bill.

Van Deerlin is chairman of the House of Representatives Commerce Committee's Communications Subcommittee, which approved the 1980 act — H.R. 6121 — in late January. Since then, Van Deerlin, Wirth and other subcommittee members have been trying to agree on a number of "clarifying amendments" to make allegedly minor changes in the text of H.R. 6121 — changes which the subcommittee agreed upon in general just before approving the bill.

Crux of Argument

Argument between Wirth and Van Deerlin involves the separation of AT&T's regulated ("monopoly") and unregulated ("competitive") activities. As presently drafted, H.R. 6121 allows the phone company to market competitive products and services — notably private-line and data processing offerings, as well as voice and data terminals — through separate, unregulated subsidiaries.

The manufacturing and development of these products and services, however, would continue to be done by Western Electric Co. and Bell Laboratories, respectively, and they would remain "unseparated" subsidiaries.

(Continued on Page 8)

Software Turns Series/1 Into Front End

By Brad Schultz
CW Staff

NEW YORK — A family of software products that enables IBM Series/1 systems to act as front-end communications processors for large mainframes and to control non-IBM devices and systems was announced here last week.

The CSC/80 product family from Conversational Systems Corp. here was designed to tie together asynchronous terminals, laser printers and Telex channels under IBM's 3270 and 2780/3780 protocols, Conversational Systems said.

The CSC/80 family is intended to give users more efficient control over networks that permit on-line data and word processing through multipurpose CRT terminals and to allow them a wider range of protocols and equipment models, a spokesman explained.

The CSC/80 family consists of four basic products:

- CSC/80-IC intelligent concentrator.
- CSC/80-TX Telex interface.
- CSC/80-WPI word processing interface.
- CSC/80-CR card reader interface.

The CSC/80-IC intelligent concentrator gives users the advantage of line concentration and synchronous protocols, the spokesman said. This reportedly extends the usable life of existing asynchronous terminals while bringing order to the user's migration from the asynchronous environment.

According to Conversational Systems, the CSC/80-IC reduces the user's line costs, gives dispersed workstations relative immunity from problems with the host processor, cuts terminal response times, raises terminal operator efficiency and facilitates network monitoring and control. The

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Carter Set on DP Matching?

Draft Registration Squabble Erupts

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Despite vehement denials from the Selective Service System, the use of computerized tax and Social Security records to enforce military registration is still under active consideration by the Carter Administration, according to Rep. Les Aspin (D-Wis.).

The dispute arose earlier this month when Aspin's office released a statement that said when Aspin "asked how the Administration would enforce its call for registration, he was told that officials were considering merging Social Security and Internal Revenue Service (IRS) records to track nonregistrants down."

Aspin's aide, Warren Nelson, explained in a telephone interview that he, Nelson, had been given that information last month by Selective Service System Director Dr. Bernard D. Rostker in "a closed briefing" on the Administration's registration plans.

When contacted by *Computerworld*, however, Rostker strenuously denied that any kind of computer matching techniques are under consideration either for registration or for identifying nonregistrants. He also denied having discussed the subject with Nelson. "I don't know where he is getting that [information]," Rostker said.

The "whole question of an enforcement plan is under study right now," the director continued. "It is my understanding that I am precluded from using that material by provisions of the Privacy Act as well as individual provisions in the IRS and the Social Security codes."

Rostker has not ruled out "at some future date possibly — maybe — asking for an amendment to the [privacy] law to allow us to use that material, but that is not our policy today and could not become our policy . . . without an explicit approval of the Congress."

Eighteen-Month Debate

The issue of a computerized, "passive" registration has been under debate for the last year and a half. The Congressional Budget Office and the General Accounting Office both recommended using computerized files already in government hands to provide the list of names, ages and addresses needed for military registration [CW, May 7].

The Carter Administration, however, has consistently opposed the plan because of the privacy considerations, the possibility it would lead to tax evasion and because the Selective Service decided not enough information could be obtained through tax and Social Security files [CW, Feb. 4].

In his Feb. 12 registration message to Congress, Carter said estimates show only 60% of draft-age U.S. citizens would be adequately identified through the file-matching process. Face-to-face registration would be 98% successful, the report estimated.

The Administration also said it would take two months to merge the Social Security and IRS files into a form useful to the Selective Service. That and the fact that the plan might be challenged as inequitable because the files contain no more than 85% of draft-age persons led the Administration to reject the proposal, the report said.

Face-to-Face Registration

With that, the Selective Service had hoped to lay the issue of passive registration to rest and get on with the job of pushing the face-to-face registration proposal through Congress.

The Carter plan calls for each man and woman born in 1960 and 1961 to fill out a form, obtained from a local post office, with his name, address, sex, birth date and Social Security number. The proposal has run into considerable opposition in both the U.S. Senate and House of Representatives, particularly because of its inclusion of women.

The computer matching issue, however, came up again when Aspin's statement, released March 3, quoted the congressman as saying the Administration is planning to use the IRS and Social Security files "as a policeman's club" to persuade citizens to register.

Furthermore, Nelson said he had been told by Rostker that the computer matching technique was the only option for enforcing registration now under consideration by the Selective Service.

Rostker said, however, "We don't have a firm enforcement plan, certainly not one that utilizes IRS or Social Security records." Any allegation to the contrary from Aspin's office is "a lot of BS," Rostker said.

This Week

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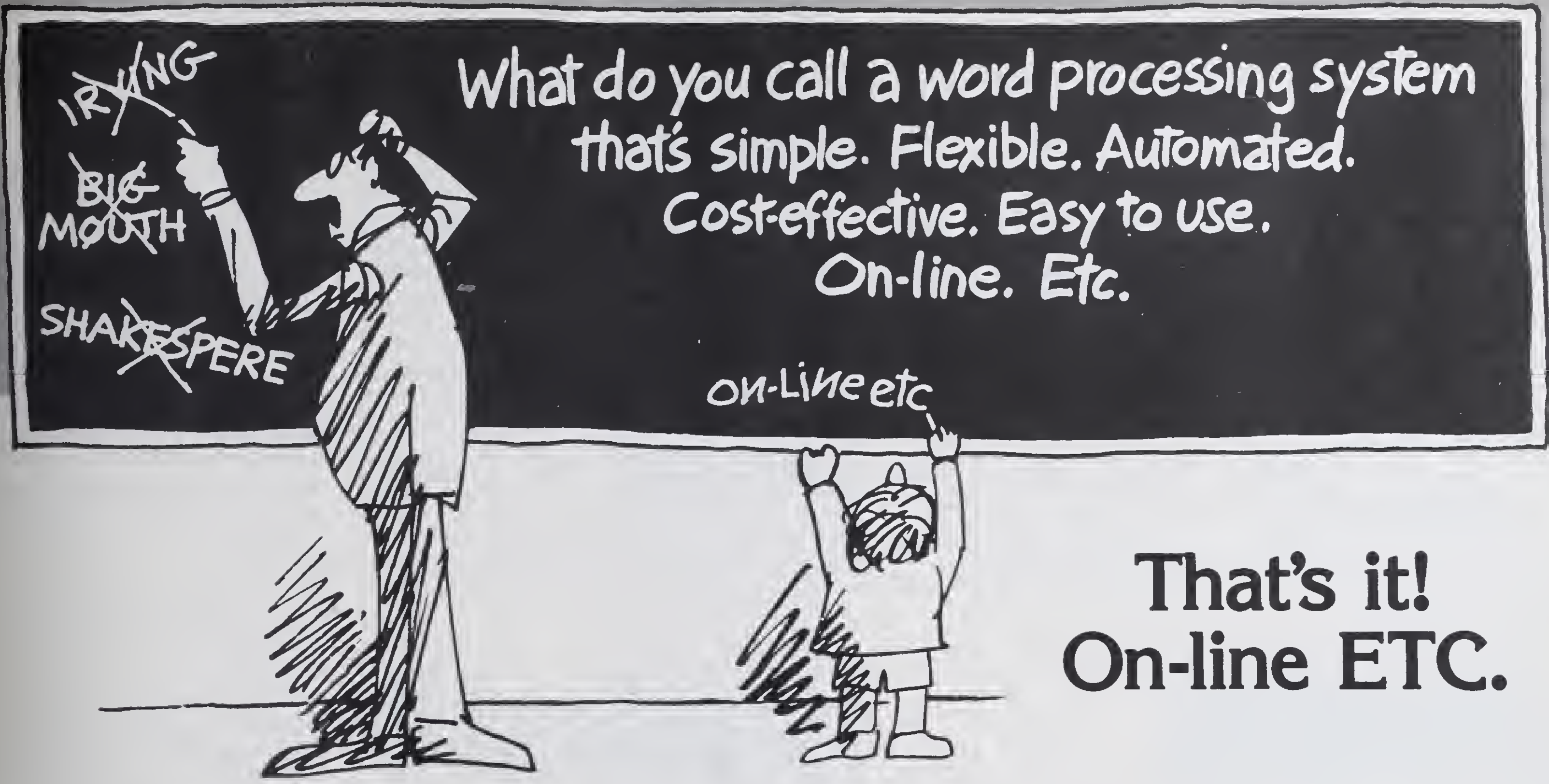
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Relative Performance[1]	1	1.3	2.0	2.4	2.5	3.2	3.8	4.6
Memory Size in Bytes (Minimum to Maximum)	2M-4M	2M-4M	2M-4M	2M-4M	4M-8M	4M-8M	4M-8M	4M-8M
Purchase Price (Memory Size)	$318,975 (2M)	$355,365 (2M)	$657,040 (2M)	$693,610 (2M)	$889,340 (4M)	$1,017,335 (4M)	$1,314,080 (4M)	$1,442,075 (4M)
Monthly Lease[2] (Five-Year Lease Term)	$7,165	$7,955	$14,145	$14,935	$19,780	$22,395	$28,392	$31,005
Memory Cycle Time (Nsec per Main Storage Unit)	580	580	580	580	580	580	580	580
Machine Cycle Time (Nsec per CPU)	116	116	116	116	116	116	116	116
Channels (Minimum to Maximum per I/O Unit)	5-14	5-14	5-14	5-14	5-14	5-14	5-14	5-14
Cache (Buffer) Size per CPU	0	0	32K	32K	8K	8K	32K	32K
Bus Architecture?	No	No	No	No	No	No	No	No
Price per 1M Byte Of Main Memory (Monthly Lease)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)	$30,475 ($625)

Footnotes

[1] Relative performance is based on an 1100/60-C1 with 2M bytes of main memory. That system is given a relative performance value of 1.

[2] Includes maintenance.

Univac Adds Two More 30 Series Rivals

(Continued from Page 1)

an on-line processor with a backup CPU.

A switch to the E series would give those users uninterrupted DP functions in the event of a single CPU crash, a Univac spokesman said.

A single failure in the I/O unit or the main storage unit will not cut out half the system.

If one CPU is interrupted, the system continues to operate in a degradated mode, the spokesman said.

Both E series models are "tightly coupled," which means they share the processing work load equally under a single copy of Univac's 1100 operating system, the spokesman explained.

The difference between the two E models is that the E2 version comes with Univac's byte-oriented extended instruction set, a series of hardware and firmware instructions that reportedly improve CPU productivity by 20% to 30%. The instruction set is directed mainly at improving business oriented functions like Cobol and data base management system communications, Univac said.

Both the E1 and E2 can be field-upgraded to the more powerful H1 and H2 multiprocessors. Both machines use the same large-scale integration technology with the multiple microprocessor-based architecture common to the rest of the 1100/60 series, according to Univac.

Customer deliveries of the E series are scheduled to begin in six months.

Efforts of DP Found Benign

(Continued from Page 1)

specific job characteristics and also rated their jobs as poor, average or excellent — independent of computer use — for each job characteristic. More than 60% received computer-generated reports at least a few times a week and 40% received them daily.

More than 40% of the managers, data analysts and clerks said computer use was responsible for increases in skill variety and feedback from their jobs. More than 30% of the managers and data analysts linked the computer with increases in task significance and dealing with others. About 20% of the clerks group reported similar experiences.

Few respondents reported that computer use created negative effects on their jobs. The exception was 15% of the clerks, who reported decreased skill variety because of computer use.

Overall, workers attributed job-enlarging influences to computing and did so increasingly as computers became more essential to their jobs.

Job Pressure

Although all three groups showed a minor increase in job pressure because of computer use, many managers and clerks in particular indicated that computers decreased job pressure by providing more pertinent information necessary for their work. Those who reported increased pressure attributed it to delays in acquiring the automated data which made it difficult to meet their own deadlines.

Only 12% of the respondents attributed increases in their level of supervision to computing. Clerks, for instance, were more likely to link decreases in closeness of supervision to computing than otherwise.

Researchers found that while some automated systems enhanced control of one group over another, it was usually not the control of workers by their immediate superior, but rather by accountants.

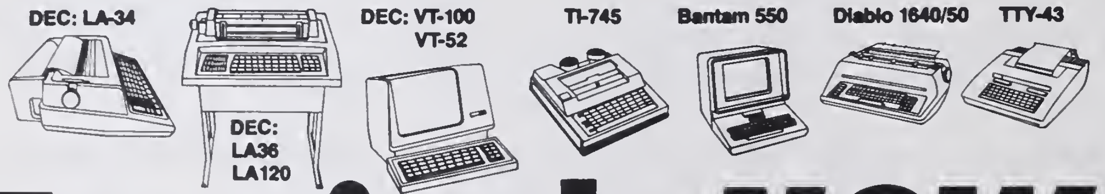
Negative Note

On a negative note, a majority of users reported difficulties in their interactions with computer specialists, difficulties in getting access to data and finding specialists, difficulties in finding reliable service, a slow response to information requests and difficulty in gaining priority to use the computer. Although no one area was an overwhelming problem, 20% to 35% of the respondents reported frequent difficulty with one of the areas.

Of all the workers surveyed, clerical employees were most likely to report that computer use decreased their skill variety (15%) and their opportunities to work with people (10%). Managers attributed to computer use more positive influences on their skill variety, task significance and dealing with others than did clerks.

Although computers proved to be least advantageous to clerks, more clerks reported that computing increased their skill variety than diminished it.

And although computers might alter work forms in jobs such as line assemblies, where workers lose control over the pace and style of their work, no such results were found in the study of the white-collar groups.



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QWIKTERM

'Information Resource Management System'

Intel Makes Major System 2000 Enhancements

By E. Drake Lundell Jr.
CW Staff

AUSTIN, Texas — Intel Corp.'s Commercial Systems Division has announced major enhancements to the System 2000 data base management system (DBMS) it acquired last year when it took over MRI Systems Corp.

The enhancements make the DBMS part of a total "Information Resource Management System" that includes features for distributed data processing, an integrated data dictionary, enhanced data communications options and improvements in the DBMS itself.

To signal the changes, the DBMS has been renamed System 2000/80.

The Integrated Data Dictionary (IDD) is the key to all of the enhancements, according to the firm. It features a prototyping design aid that allows users to add, delete or change data items, records and definitions — even after a data base is in full production.

Furthermore, IDD's Define/Control facility for the implementation of data bases allows users to design, analyze and modify data structures as well as provide multiple indexing and security specifications.

An IDD report facility permits up to 24 reports of what is contained in the data base environment as well as data base usage information. An ad hoc reporting capability allows requests for descriptions of data items, logical relationships and user procedures.

In addition to breaking out the IDD from System 2000, the enhanced System 2000/80 features three languages: Quest, Plex and Report Writer.

Quest is for end-user browsing of data base files and is a free-form, natural language system, the firm said. However, the language has search, display and update capabilities that can be used by an applications developer for data base prototyping and testing.

Plex is Intel's programming language extension to Cobol, Fortran, P1/I and assembler. It was designed for programmers in high-volume, production-oriented environments.

The verb approach used by plex is more efficient than the Call approach used by DBMS like IBM's IMS, Intel claimed. For example, one line of code in Plex can often substitute for five lines in an IMS system, the firm said.

With Plex, the programmer or application developer can create input to the data base from existing files, interface existing programs to the data base, specify relationships between multiple data bases and perform other application-specific tasks, Intel said.

Plex also has Queue and Load utilities. Queue allows a number of update transactions to be queued until a "process" directive is issued by a Plex program. The transactions are then applied serially against the data base, and all control and index areas are updated in parallel.

Similarly, the Load utility permits mass additions to production data. It inserts new records directly and serially to the data base and, with a "process' directive, synchronizes the updates to all control and index areas.

Report Writer allows both end users and programmers to describe multiple reports with a free-form language and to generate reports against all or selected portions of a data base. Up to 99 report formats can be processed in parallel with a single pass of the data base, according to the vendor.

The System 2000/80 DBMS runs on IBM (including the 4300 series), Con-

(Continued on Page 6)

DBMS, Fast 3805 Coupled by Intel

(Continued from Page 1)

throughput increase as high as 100%, the firm said based on internal tests, while reducing response time by 50%. In addition, Intel noted that as the complexity of qualification criteria for data base accesses increases, the percentage improvement increases.

The Fast 3805 can have a capacity ranging from 11M bytes to 72M bytes. It has been used primarily for paging in virtual machines up to this point.

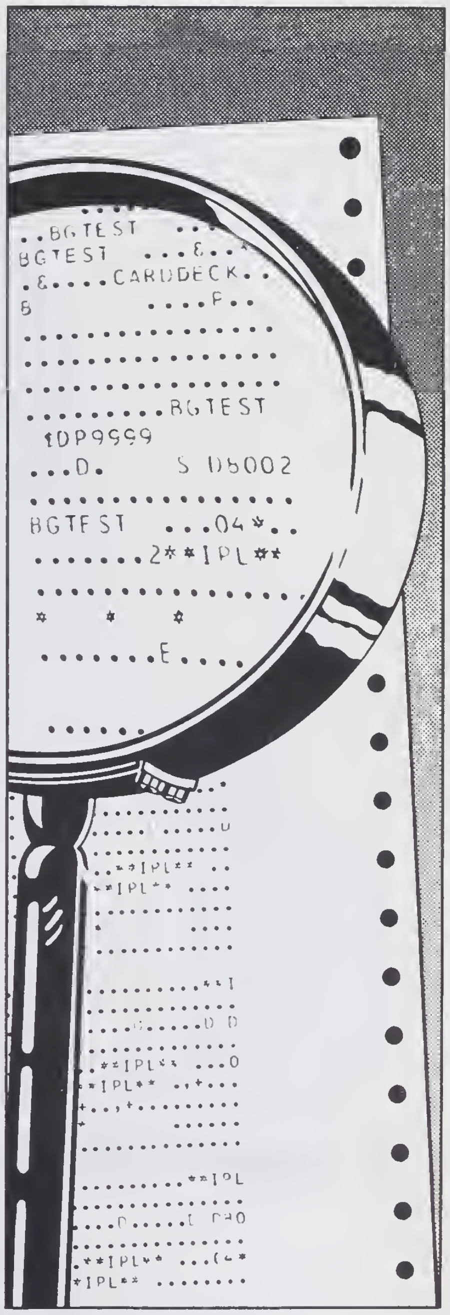
'Data Base Computer'

While Intel was not talking about future developments along these lines, the firm admitted that research is continuing toward the development of a true "data base computer." However, company sources indicated the next step in this direction might involve placing high-usage data files as well as the pointer tables on 3805-type memory.

This would provide rapid access to those files as well as to the pointer files — thereby providing more rapid access to the parts of the data base used often.

Users who want the Data Base Assist Processor option — which will be available in the first quarter of next year — must have a Fast 3805, which starts at $130,000, and the System/2000/80 DBMS, which ranges in price from $60,000 to $100,000 in typical configurations. The option itself will cost about $25,000.

Intel's Commercial Systems Division is at 12675 Research Blvd., P.O. Box 9968, Austin, Texas 78766.



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Software Lets Series/1 Act as Front-End Processor

(Continued from Page 1)

concentrator also extends the capabilities of "dumb" CRT terminals and teletypewriters, the vendor added.

Users of asynchronous terminals need a concentrator like the CSC/80-IC, Conversational Systems said, because they are:

- Draining too much of the host CPU's resources when they subject it to character-by-character input.
- Left in the lurch when the host CPU goes down.
- Experiencing poor terminal response times caused by CPU contention.
- Unable to properly "review" data before transmitting it.
- Lacking sufficient local storage to smooth demands on the network's overall resources.
- Hard-pressed to access the more sophisticated communications software that resides in the host CPU.

Like the other three CSC/80 products, the CSC/80-IC is based on a Series/1 minicomputer. The intelligent concentrator features a disk journal/-data capture mode of operation, allowing local terminal input to continue even when the host CPU is unavailable.

When the host is available again, journaled transactions are interleaved with new transactions until the full disk journal is transmitted, the spokesman explained.

Concentrator Environment

Working in an environment like that shown above, the CSC/80-IC supports dumb CRT terminals in full emulation mode and any Teletype Corp.-compatible teletypewriter in partial emulation mode.

In full emulation mode, the concentrator interfaces a dumb CRT terminal to a host CPU as though the terminal were an IBM 3277. This mode is fully compatible with existing 3271 networks and host software, the spokesman maintained, and supports both batch input and protected fields.

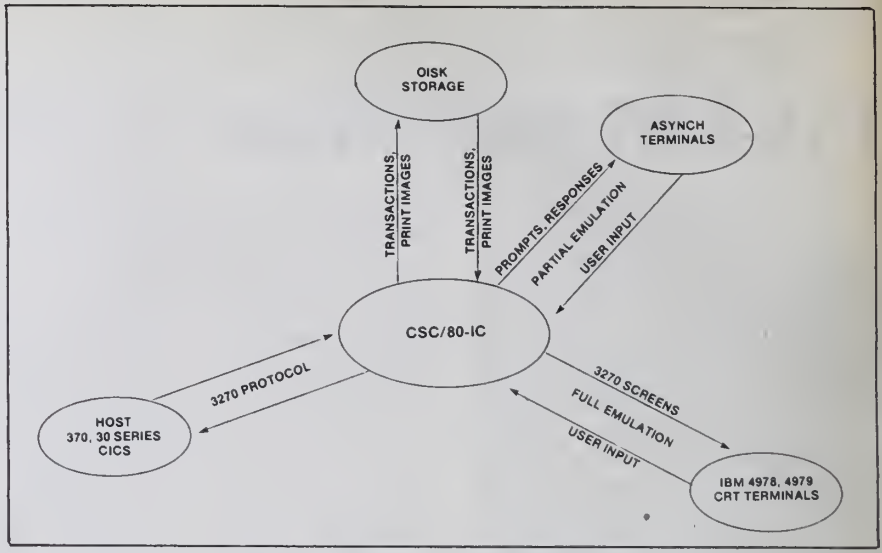
In partial emulation mode, Teletype-compatible terminals appear to the host as 3277s, but have restricted functionality and must "cooperate" with the host software, the spokesman pointed out.

A typical CSC/80-IC application would be upgrading teletypewriters to run as 3270s while also supporting full emulation to one or more dumb CRT terminals, he added.

Telex Interface

The CSC/80-TX Telex interface was designed to link users of IBM's 370 mainframe family, the IBM System/34 and other processors with the Telex network of more than 7,000 terminals, the spokesman said.

The interface can convert diskette-stored data to a format understood by Telex facilities. The integrated user can direct a mix of data and word flows to this interface via the CSC/80-IC or through a third member of the CSC/80 line: a word processing interface dubbed the CSC/80-WPI.



Typical Intelligent Concentrator Environment

As an adjunct to electronic mail applications, the CSC/80-TX can locate all messages on a diskette somewhere in a user's network and attempt to deliver them to a specified Telex node, the spokesman indicated. The interface can batch transmissions to the same node, store the answerback received onto the diskette and retry on connection failures, he said.

The CSC/80-WPI word processing interface can give the integrated user a means of editing and generating text processed by a Series/1, a Wang Laboratories, Inc., or IBM OS/6 word processor, the spokesman added. It fits IBM's 6670 laser printers as well.

The CSC/80-CR card reader interface allows the user to link a Series/1 to IBM S/5230 badge readers.

The CSC/80-IC, TX, WPI and CR cost between $3,000 and $15,000 each, depending on the capabilities specified. Conversational Systems is at 132 W. 31 St., New York, N.Y. 10001.

System 2000 Gains Major Enhancements

(Continued from Page 5)

trol Data Corp., Univac and IBM-compatible mainframes under more than 30 operating systems. The data base manager element assures hardware and operating system transparency in supporting multiple vendor environments and in migrating System 2000/80 DBMS applications from one system to another, Intel said.

Support for Distribution

The other major features in last week's announcement concern distributed data bases. The first — Multiple Systems Coupling (MSC) — provides for channel-to-channel communications between two or more IBM-compatible processors at one site, while the second provides Distributed Network Support (DNS) for IBM CICS environments and permits remote sharing of data bases.

Under MSC System 2000/80, DBMS applications or transactions can execute on one processor and access data bases managed by another processor. Alternately, several applications processors could access one processor that would be responsible for all DBMS activity, the firm said.

Communications between the processors is handled by the MSC and is transparent to the user, the firm added. MSC software resides on all of the processors supported by the distributed environment, while the System 2000/80 DBMS resides only on the processors with data base responsibilities.

Each MSC contains a "table of resources" for the system as a whole, providing the pointers to the CPU with the particular data sought by the application program. This table of resources is updated and formatted by the system's data base administrator.

DNS works closely with IBM's CICS to provide the same type of resource sharing in System Network Architecture-type environments and piggybacks on the CICS facilities to accomplish this, Intel said.

The MSC feature is in beta testing, the firm said, and will be available in the near future. DNS will be available in the third quarter.

Communications Options

In the past, Intel supplied simple communications interfaces to CICS and to other systems on request, but with its latest announcements the firm has added a host of other interfaces and communications options.

For on-line transaction processing, the firm has brought out a Generalized Communications Interface that can be used with IBM's CICS and Intercomm from SDA Products, Inc., Shadow II from Cullinane Corp. and Task/-Master from Turnkey Systems, Inc.

For time-sharing support, interfaces are offered for IBM's Time Sharing Option and for Tone Software Co.'s Tone package.

The data communications facilities reside in their own address space or region, as does the System 2000/80 DBMS, so they are isolated from failures. The DBMS communicates with the data communications facility — as well as with other jobs requiring DBMS access — through an Intel-supplied Type II Supervisory Call (SVC) for the IBM operating system.

Applications Development

For on-line applications development, Intel is offering Taps/80 from Decision Strategies, Inc. This system was designed to provide portability between the batch and teleprocessing environments.

With Taps/80, users can develop programs in the batch environment and then execute them under CICS without modification, Intel said. At the same time, however, the package includes special functions such as screen mapping, message editing and processing sequence of terminals.

Another package for the communications environment is Query/Update by Example (Qube). Designed for the casual user, the facility is similar in structure to IBM's Query by Example (QBE), Intel said, but it allows users to update records where authorized, rather than just browse through the DBMS.

A function-driven facility, Qube reportedly requires no syntax knowledge from the user. The system is oriented toward IBM 3270 environments.

Pricing of the "Information Resource Management System" is dependent on the number of modules selected. A typical DOS installation would probably cost about $60,000, while an OS installation would probably run $100,000.

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At Stanford Business School 'Market'

'Shares' of Presidential Aspirants Sold, Traded

By Marguerite Zientara
CW Staff

PALO ALTO, Calif. — If you think Presidential politics is a confusing blend of theatrics and the numbers game, consider Stanford Business School's Presidential Aspirants Market — a computer-aided "candidate trading" system whose buying and selling action approaches the frenzy of any convention floor.

While the "market's" Hewlett-Packard Co. Model 2000 CPU — normally used by the graduate school for class scheduling — does not actually process "buy" or "sell" transactions, it does keep track of students and faculty who want to sell certain stock at a certain price.

Stanford's trading began in January, when a group of faculty members sold 650 portfolios of stock to traders. Selling for $5, each portfolio consisted of one share of each of the 10 Presidential candidates.

The ultimate value of each share will be $5 or nothing, depending on the outcome of November's election. A Kennedy share, for example, can be sold back to the faculty group at $5 (plus interest) only if Edward Kennedy becomes President. Otherwise, it is worthless.

Realities of Trading

The premise for the trading is similar to over-the-counter trading on Wall Street. "If you bought that sheet and held onto it, you'd have one winning ticket and nine losing tickets," economics professor Jeremy Bulow explained.

"Of course, the point is not just to buy a sheet and hold onto it," he added, but rather to learn some of the realities of market trading.

"Let's say you happen to think George Bush is a strong candidate and somebody else thinks he's a weak candidate. He might be willing to sell you his Bush for 75 cents," Bulow theorized. "In that case, if Bush lost, [the seller] would have reduced his original investment from $5 down to $4.25, thus making a 75-cent profit."

On the other hand, if the buyer of the Bush stock held nothing but Bush, and if Bush lost, then that trader would be left with nothing come November.

In the meantime, however, the values of the shares rise and fall with the political winds, and timely trading can produce quick earnings. On the day of the Iowa caucus, for example, one student bought 10 Bush shares for about 70 cents each.

A few days later, after Bush's surprisingly strong showing in Iowa, each Bush share was worth about $1.20.

And before last week's Southern primary vote in Florida, Alabama and Georgia, Carter led the aspirants at $2.80 a share, with Reagan the closest behind at 80 cents. Next in value was Bush at 70 cents, followed by Kennedy at 40 cents.

Ford cost 25 cents; Baker went for 20 cents; Anderson, Crane and Dole were 15 cents each; and Connally sold for a nickel a share.

The Southern primaries changed all that, however, with Carter's overwhelming victories in the Democratic vote and Reagan's solid trouncing of head-to-head contender Bush in all three states. The results?

Bush experienced the biggest drop, from 70 cents to 45 cents a share. Kennedy also fell, from 40 cents to 22 cents per share.

Shares of Baker and Connally — who both withdrew from the race the previous week — became worthless.

On the positive side, Carter rose in value from $2.80 to $3 a share, and Ford doubled in value, from 25 cents to 50 cents a share.

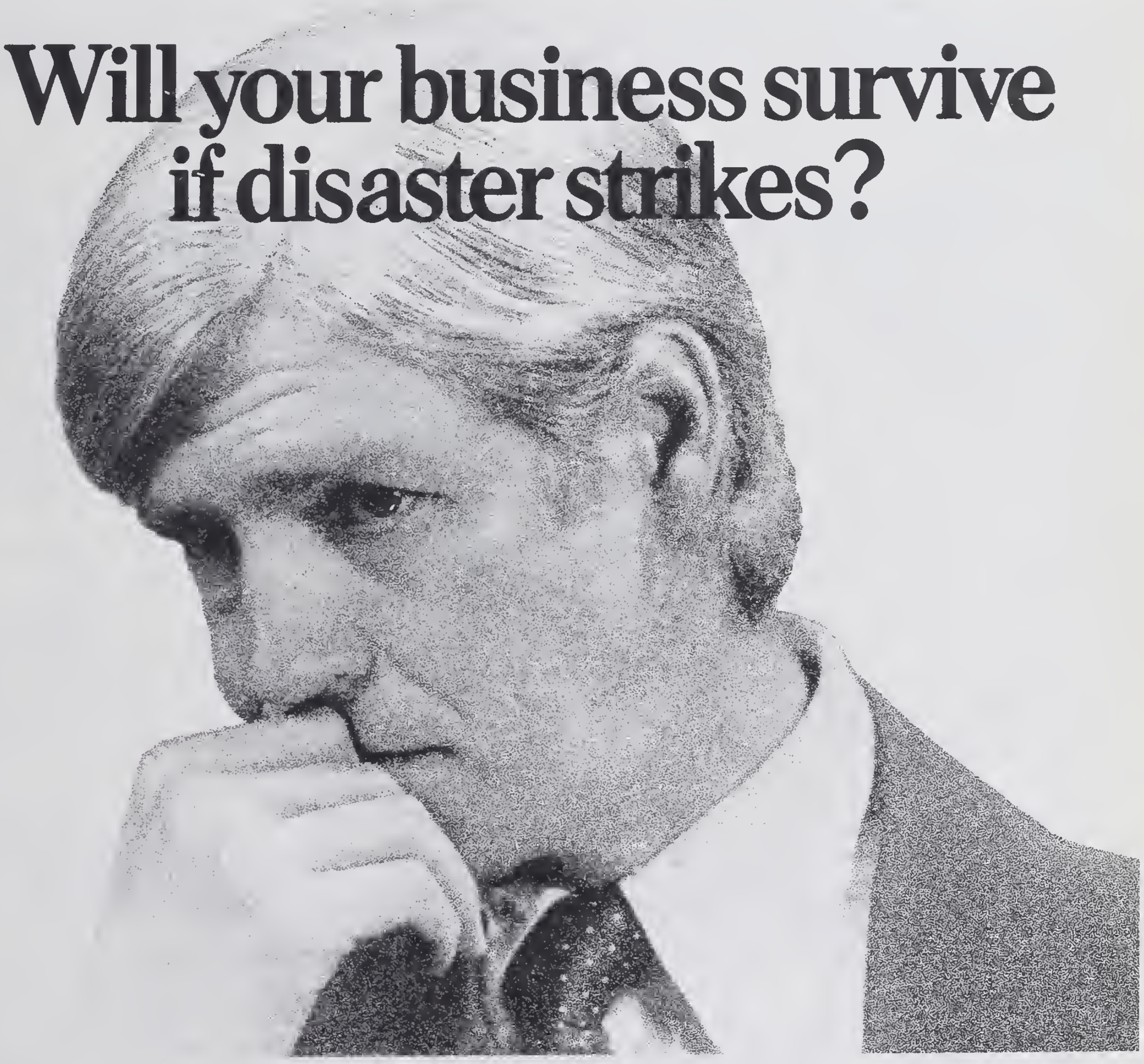
Reagan rose from 80 cents to 90 cents in value; shares of Anderson, Crane and Dole each increased 10 cents each; and Brown remained the same at 1 cent.

Traders can access and input data to the computer through Texas Instruments, Inc. Silent 700 terminals. A trader inputs his name, phone number, the price at which he is willing to buy or sell a candidate's shares and the expiration date of the offer.

"Of course, they use a password so they're the only ones who can either delete or change the bid in their name," Bulow said.

While transactions could also be processed through computers, "we felt that probably — unless we put an unbelievable amount of work into the thing — someone would figure out a way to break the system, tamper with it and sell someone a lot of stock they didn't want to buy," he explained.

With "well over 100" student and faculty traders on the scene, Stanford's market comprises over $3,320 worth of outstanding stock. In contrast, similar systems at Stanford's undergraduate economics department, Yale University and Princeton University — none of which is sophisticated enough to use computers — are worth $800, $150 and $100, respectively.



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IBM Asks Rehearing to Oust Judge Edelstein

By Connie Winkler
CW Staff

NEW YORK — IBM, which late last month lost the first round in its fight to remove Judge David N. Edelstein from the U.S. vs. IBM antitrust trial, has asked the court of appeals here to reconsider.

A three-member Second Circuit Court of Appeals panel ruled on Feb. 25 that Edelstein, who has been handling the lengthy litigation since 1972, should not be removed — "recused" — from the case because of alleged bias and prejudice against IBM.

IBM lawyers from Cravath, Swaine & Moore said in the rehearing petition that they have found three legal errors with the Feb. 25 ruling.

IBM asked for the "Rehearing and Suggestion for Rehearing en Banc" so that the Feb. 25 ruling would be reconsidered by as few as three or as many as 10 appellate judges.

The petition introduction acknowledges that the recusal request after almost four full trial years, was "serious and unavoidably distasteful.

"We believed then, and now, that the cumulative evidence of bias and prejudice was so overwhelming that it would overcome the natural reluctance of a reviewing court to take the action we sought," the papers said.

IBM initially filed the recusal petition Sept. 14 and argued it before Judges William H. Mulligan, Thomas J. Meskill and Ellsworth A. Van Graafeiland on Oct. 16.

The appellate opinion by Mulligan said IBM did not show the extrajudicial prejudice — from sources outside the courtroom — necessary to remove Edelstein. The court also complained of the waste of taxpayers' and IBM stockholders' money.

The district court trial itself has been speeding up. Only four witnesses — all economists — are left to testify.

Last Tuesday a big lump of testimony was handled in less than an hour when the previous testimony of IBM Chairman and Chief Executive Frank T. Cary was submitted in lieu of his taking the stand. That testimony was from actions against IBM brought by the Transamerica Corp., Telex Corp. and Memorex Corp.

In connection with the Cary testimony, the Justice Department issued a broad subpoena in February 1979. IBM moved to quash that subpoena charging it called for every data processing document in the corporation and that it would take 62,000 man-years to comply with it at a cost of $5 million.

It was that Cary subpoena and Judge David N. Edelstein's order that IBM comply which caused the computer manufacturer to bring the petition to remove the judge, IBM said at the time.

Both For and Against Bill

Intensive Lobbying Begins Over H.R. 6121

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — An intensive lobbying campaign for and against the proposed Communications Act of 1980 surfaced here last week.

Some members of the House Commerce Committee's Communications Subcommittee reported receiving from 40 to 150 letters each asking for quick passage of the bill, H.R. 6121.

And a telephone company spokesman acknowledged that the Bell System had "encouraged people to ask Congress to pass legislation," but emphasized that no particular bill was specified. "Our union people may have been encouraged by their unions," he added.

The letters to the congressmen expressed a common theme — that passage of H.R. 6121 is needed to protect the U.S. telephone industry and its related jobs against foreign competition, spokesmen for subcommittee members indicated.The letters came from a major airline, a public school system, a wine and cheese shop and members of the two major telephone industry unions, the International Brotherhood of Electrical Workers and the Communications Workers of America.

Opposition to Bill

Meanwhile, AT&T's competitors continued to oppose passage of the bill in its present form. The latest objection came last week from Herb Jasper, executive vice-president of the Ad Hoc Committee for Competitive Communications, which represents the major specialized carriers. In a letter to Rep. Harley Staggers, chairman of the House Commerce Committee, Jasper said that despite the bill's stated goal of fostering competition, the present draft "would be positively damaging to competition . . . . The principal reason . . . is that . . . it would authorize AT&T to deregulate itself with respect to equipment" and most long-distance service offerings.

Attached to Jasper's letter was a reprint of an "AT&T Management Report" containing the text of a recent speech given by Vice-Chairman James E. Olson to a group of Bell System managers. Olson's remarks tend to support the charge by AT&T's competitors that the main reason for the current impasse over the bill (see story on Page 1) is the telephone company's opposition to further separation of its regulated and unregulated activities.

Even though the requirements for separate subsidiaries have been softened "somewhat" in the latest draft of H.R. 6121, Olson said "it's obvious that we still have some work to do with the subcommittee. We must impress upon them that . . . we remain firmly opposed to any kind of costly, inefficient fragmentation that would disrupt the close working relationships . . . among the units of the Bell System."

Rewrite Efforts Stymied

(Continued from Page 1)

The computer industry has led the opposition to this latter relationship, charging that it would enable AT&T to subsidize the development and manufacture of competitive products and services with revenues earned from regulated communications offerings. The phone company could then underprice its competitors, industry spokesmen contend.

H.R. 6121, as presently drafted, attempts to discourage such cross-subsidies by requiring Western Electric and Bell Labs to establish separate accounting systems that clearly differentiate their expenditures on behalf of regulated and unregulated products and services. The bill also requires separation of the related personnel and other resources, but it allows technical information and technology to be exchanged freely across this dividing line.

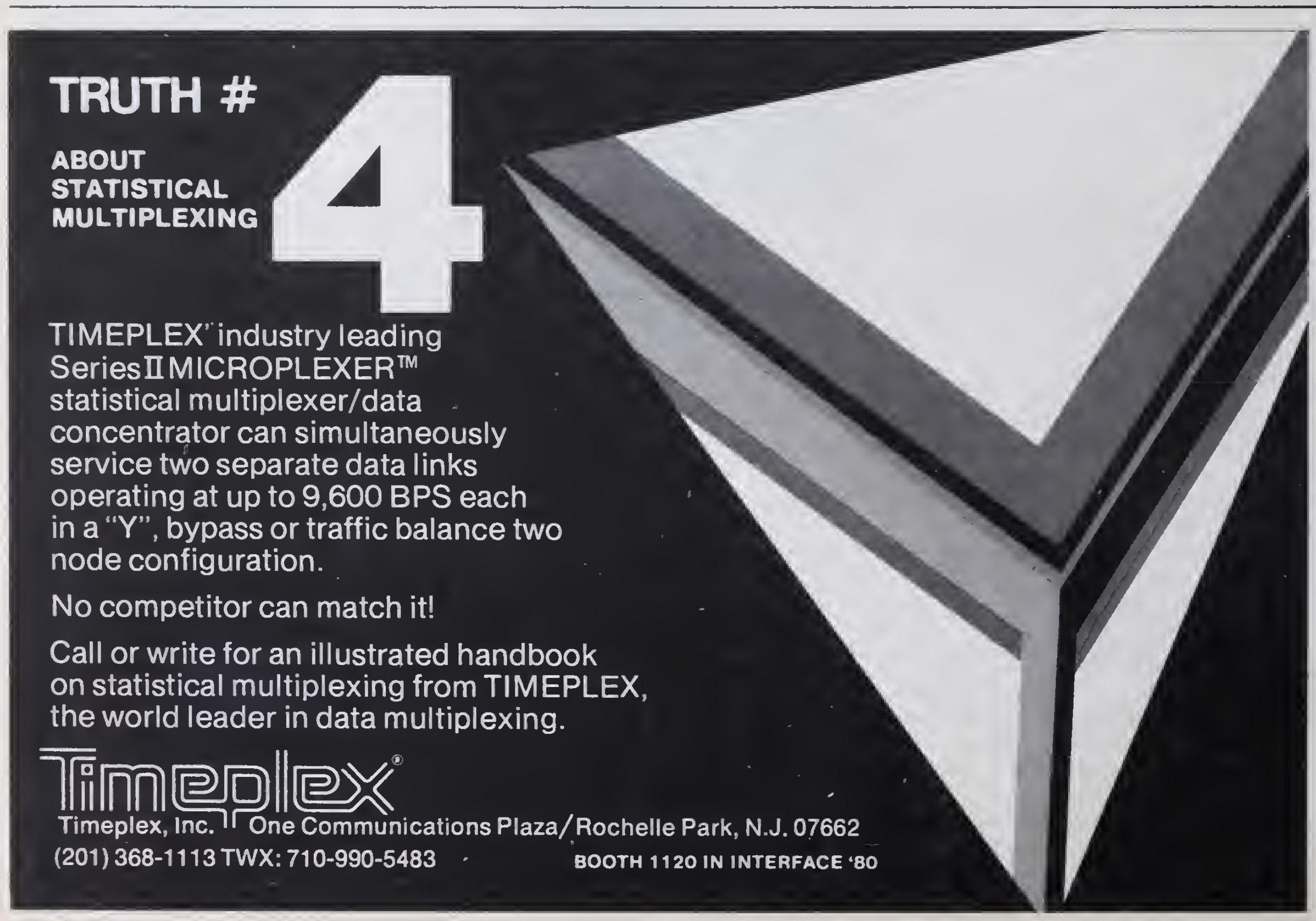
Wirth and the computer industry oppose such exchanges, which are frequently referred to as "indirect relationships." Their reason: Such relationships allegedly provide AT&T with another means of subsidizing competitive offerings with revenues earned from the regulated side of its business.

Wirth insists that the "indirect relationships" question was discussed by the subcommittee before it approved H.R. 6121 in January and that the members agreed to the changes he proposed. However, despite this alleged agreement, Van Deerlin has opposed three versions of a "clarifying amendment" Wirth drafted to implement the changes.

A member of the Colorado congressman's staff says the opposition is a result of AT&T's unwillingness to accept the changes. Wirth implied the same thing in a recent letter to Van Deerlin in which he said, "I had no reason to believe there was a problem implementing this agreement until Feb. 12, when various industry representatives strongly attacked the eight-page draft my staff had presented. . . . Consensus then evaporated."

Although the eight-page draft was followed by two revisions, according to Wirth the whole rewrite effort within the subcommittee appears to be "deadlocked" at the moment. He also complained to Van Deerlin about "suggestions" that "I am offering a 'new' amendment [containing] 'new' competitive protections . . . designed to destroy consensus on the legislation."

Wirth insisted that "this is not an 'amendment' that stands by itself, nor is it 'new' — it is an integral part of the fabric of earlier agreements found in the subcommittee bill."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Metro I to Tie 17 Cities May 1

AT&T Files Tariff for Voice/Data/Fax Service

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — Western Union Telegraph Co. unveiled a tariff early this month for a switched voice-grade communications service that offers substantial savings to users of Bell's Wats and long-distance dial-up circuits. The tariff will become effective May 1 if there are no objections from competing carriers.

Dubbed Metro I, the proposed offering was designed to handle voice, data and facsimile communication. It will initially interconnect 29 cities, including Chicago, New York, Los Angeles, Washington, San Francisco and Atlanta.

Two dedicated switches — one in New York, the other in Chicago — will be provided at the start of the service. A third one, in Los Angeles, is scheduled to be installed during the second year of operation, when Western Union expects to extend the service to 17 more cities.

Time and Distance Rates

A customer will interconnect with the Metro I network through either a shared or dedicated access line. Rates are based on message time and distance, plus a number of other factors.

The monthly time charges range from 20 cent/min for 6,000 minutes or less down to 10 cent/min for more than 12,000 minutes.

Distance charges range from a penny to a tenth of a penny per 100 miles.

A "call completion charge" of 2- to 3.8 cent/min will also be charged.

Rate Comparisons

In the tariff data it submitted to the Federal Communications Commission, Western Union included a table comparing proposed Metro I rates with those of competing services offered by three specialized carriers — and AT&T. The comparisons are based on a "composite national calling pattern" encompassing the 46 cities the company expects to be serving two years after Metro I goes operational.

The Metro I rates listed in the table also assume use of a shared access line rather than a higher priced dedicated facility.

Up to 6,000 min/mo, Metro I rates are only slightly higher or lower than those charged by the specialized carriers for similar switched offerings. Above 6,000 min/mo, however, Metro I is significantly cheaper.

The specialized carriers included in this comparison are Southern Pacific Communications, Inc., MCI Communications Corp., and International Telephone and Telegraph Corp. (ITT). The services involved are MCI's Execunet, Southern Pacific's Sprint and ITT's City Call.

Metro I vs. MTS, Wats

The table also compares Metro I rates with AT&T's Message Telecommunications Service (MTS) and to Outgoing Measured Time Wats, Bands 3 to 5. The Western Union offering is generally much cheaper, particularly for those customers whose traffic amounts to 6,000 min/mo or less. Nearly all Metro I customers employing shared access lines are expected to have usage levels within this range.

For 600 min/mo, the Metro I rate is $200 vs. $240 for station-to-station MTS and $260 for Wats. At 1,000 min/mo, the rates are $333, $400 and $520 respectively.

At 6,000 min/mo, Metro I costs $1,996 and MTS, $2,400. The comparable Wats rate is $2,040 for three service lines and $2,120 for four.

Other Charges

Besides time, distance and call completion charges, "basic" Metro I service includes a $40/mo fee for each dedicated access circuit. The charge is even higher for dedicated access customers outside New York and Chicago; they must pay for a long-distance circuit to the Metro switch in one of these cities.

There is also a minimum monthly usage charge for Metro I service — $40 for shared access customers and $250 for those who employ dedicated access lines. However, users whose traffic exceeds certain levels receive discounts.

In the case of shared access customers whose usage is more than 6,000 min/mo, the time and distance charges are reduced as much as 50%. For dedicated customers, the discount begins at 2,000 min/mo and amounts to 35%. For higher traffic volumes, it goes up to 70%.

Reduced rates are also offered for night and weekend calls.

Access Method

To access the Metro I network, the user will dial an assigned local telephone number, then key in a six-digit authorization code which enables him to reach the called terminal.

The first authorization code is provided at no additional charge, but each additional code costs $5/mo.

There are several other optional features, including automatic dialing, restricted authorization codes, traffic reports, abbreviated dialing, alternate voice/data terminations and direct inward dialing.

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U.S. Companies Ask Help

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Divided authority for making U.S. international telecommmunications policy is hamstringing American firms trying to cope with foreign regulators that would restrict the free international flow of data, a congressional subcommittee was told last week.

The situation can be remedied only by creating a centralized, high-level office responsible for U.S. policy in this area, executives of four major U.S. companies in the DP-telecommunications field told the House of Representatives Subcommittee on Information and Individual Rights Monday.

The panel called two days of hearing on transborder data flow because of a perception of "confusion and lack of coordination" among government agencies, according to Subcommittee Chairman Rep. Richardson Preyer (D-N.C.).

Too often, he said, "our efforts have been reactions to steps taken by others, rather than affirmative steps based on a comprehensive policy." That statement was not disputed by Monday's witnesses.

IBM Suggestion

While John Rankine, IBM director of standards, product safety and data security, did say IBM has not experienced any problems of great significance because of transborder data flow restrictions, he added that as the issue "continues to mature . . . there will be increasing need for close coordination within the government to ensure consistent action in the national interest."

Rankine suggested the U.S. Trade Representative's office might be the best candidate for the postion of coordinating the functions now performed primarily by the State Department, the National Telecommunications and Information Administration (NTIA) and the Federal Communications Commission (FCC).

Representatives of firms with widespread data communications networks were not so moderate. Phillip C. Onstad, Control Data Corp. manager for telecommunications policies, told the subcommitte that U.S. treatment of international telecommunications issues is "diffuse, fractionated and divided."

Detailing his firm's continuing battle with Japan's international record carrier, Kokusai Denshin Denwa Co., Ltd, (KDD), to extend CDC international DP services network into Japan, Onstad said problems still exist "four years after (CDC) first sought assistance from U.S. government entities."

Foreign governments, in many cases both providers and regulators of communication services, are taking advantage of the policy "vacuum" to discourage U.S. firms from operating in their countries and hindering American firms trying to compete with domestic industry, he continued.

Onstad suggested Congress establish "a single entity to handle international telecommunications and information flow matters."

'Agonizing' Negotiations

Onstad's statement was supported by the testimony of Tymshare, Inc. Vice-President Warren E. Burton, whose company has had similar problems dealing with KDD.

Tymshare's negotiations with KDD have been "agonizing, compounded by our disappointment and frustration due to the apparent lack of interest, assistance and results from any U.S. agency," he said.

Burton called for a "designated senior official" in the executive branch to be given "the responsibility to represent the best interest of our industry and our country" through a "unified posture" on these issues.

The last witness Monday, GTE-Telenet Communications Corp. Vice-President Philip M. Walker, suggested a "consortium approach" to negotiating international telecommunications networks interconnections.

Under this approach a committee composed of all U.S. firms offering a certain data communications service plus a representative of either FCC or NTIA would negotiate with foreign communications regulators a "blanket operating agreement."

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Adoption Seen Coming Soon

No Delay on OECD Privacy Guidelines: U.S.

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — Responding to public perception that the international privacy guidelines under consideration in the Organization for Economic Cooperation and Development (OECD) are being delayed, perhaps indefinitely, U.S. officials here have strenuously reassured U.S. businessmen that negotiations are still on track.

At a State Department meeting recently, government representatives said the draft voluntary guidelines — which essentially reflect the U.S. position that nations should not unduly hinder free international flows of data [CW, April 23] — will be adopted soon with little or no change.

The U.S. is already moving to develop a position for the follow-on part of the OECD information policy study — consideration of the political and economic implications of nonpersonal data processing and transfer. A proposal for a U.S. position during this phase ran into some strong criticism from industry representatives at the meeting of the Advisory Group on International Data Flows.

The proposal was criticised for being too narrow and for playing into the hands of European governments, whose protectionist tendencies are of major concern to U.S. multinational corporations.

However, Arthur Bushkin, of the National Telecommunications and Information Administration (NTIA) and a member of the interagency task force that developed the proposal, said the proposal is not definite and changes could be made to accommodate the views of U.S. industry.

Reacting to advisory Committee Chairman Hugh Donahue of Control Data Corp., who expressed industry concern that the OECD guidelines are being "delayed," NTIA's Bill Fishman, a U.S. representative to the guideline negotiations, said it is "a pernicious misunderstanding of the situation" to say there is a delay.

'Guidelines . . . Will Be Adopted'

"The sum and substance of it is that at the moment . . . substantial consensus exists" on the guidelines. They will be adopted, Fishman said, probably within the next six months. The government had earlier predicted adoption by last month.

Canadian objections to the guideline draft should be resolved soon, he said, as should reservations on the part of Belgium and the Scandinavian countries, which have raised what Fishman termed "drafting questions."

Agreeing with Fishman, State Department science adviser Morris Crawford, who is retiring this month, said that "very intensive negotiations" are continuing. "The reservations have been narrowed to the point that we can reasonably expect in a short while that the only remaining reservations will be those of the French," Crawford said.

Fishman reported that the French delegation to OECD will not be in a position to comment on the guidelines until after an internal French study of the subject is completed, slated for May.

When the guidelines do come before the OECD Council of Ministers for consideration, there may be some "language changes" not to U.S. liking, he said. "But I think we can say in a gross sense nothing that is currently being debated is of a fundamental nature" as far as the U.S. is concerned.

Turning to "phase two" of the OECD work — political and economic implications of nonpersonal data — Crawford said the high-level OECD conference originally scheduled for this month in Paris to set the groundwork for this phase has been postponed at least until the fall.

A tight OECD meeting agenda this spring and the protracted negotiations on the privacy guidelines were some reasons given for the postponement.

Recognizing that OECD resources are limited, the U.S. has developed a proposal for how the OECD should structure this next step in the negotiations, a proposal that will be informally presented to the OECD Committee for Scientific and Technological Policy this week, Crawford said.

Two Working Groups

The U.S. is proposing two working groups, one to study the effect of computers on productivity and employment and the other to analyze information flows and invisible trade barriers.

Advisory committee member Harry DeMaio, IBM data security programs director, objected that the first group's mandate should cover all facets of information technology, including software and communications.

Noting that European governments are suppliers as well as regulators of communications services, DeMaio argued that leaving out communications would play into the hands of the Europeans.

The second working group would, according to the U.S. plan, study statistical information on the information industry, data bases, data networks, electronic funds transfer and related topics, as well as the various government policies and trade barriers that will affect those industries, according to Crawford.

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CD-1

Comsat Official Urges Field Trials of Intelpost

By Phil Hirsch
CW Washington Bureau

WASHINGTON, D.C. — The Federal Communications Commission (FCC) should allow the U.S. Postal Service (USPS) to begin field trials of Intelpost, an international facsimile service, because delay will only give other countries a head start in exploiting what promises to be a lucrative market, a House of Representatives subcommittee was told here last week.

The advice came from Dr. John L. McLucas, executive vice-president of Communications Satellite Corp. (Comsat), which has been developing Intelpost jointly with the USPS. The basic obstacle at the moment is an FCC decision last October that rejected tariffs filed by two U.S. international record carriers (IRC) needed to implement Intelpost.

The commission said the tariff's would permit the IRCs' circuits to be resold exclusively by USPS, thus violating a 1976 FCC decision which bars a carrier from allowing one customer to resell or share a circuit unless all other customers are granted the same privilege.

The two IRCs — TRT Communications Corp. and RCA Global Communications, Inc. — have asked the FCC to reconsider its decision, but so far this hasn't happened — and according to an FCC source contacted last week, reconsideration of the tariff rejection is unlikely for several more weeks.

Meanwhile, the USPS has threatened to bypass the FCC by routing Intelpost messages overseas via Canada if it cannot obtain circuits from American IRCs [CW, March 10].

McLucas' testimony before the House Postal Modernization Subcommittee was clearly meant to mobilize congressional pressure for a compromise solution — one that would allow field trials of Intelpost to go forward and eliminate the need for a Canadian connection.

The USPS proposal to transmit Intelpost messages via Canadian carriers, he pointed out, "is a very troubling turn of events which is unnecessary under the circumstances and will inevitably erode U.S. leadership both in international postal services and international communications.

"Without full direct U.S. access to the Intelpost network, it will be Canadian postal authorities and Canadian communications companies, not USPS and U.S. companies, which will gain the . . . expertise [needed] for further development. . . . Such a result would be particularly unfortunate and ironic since Comsat . . . developed much of the technology [and] the USPS . . . initiated the worldwide interest in Intelpost which is now evident."

Another speaker at last week's House subcommittee hearing — George F. Knapp, a vice-president of International Telephone and Telegraph Corp. (ITT) — indicated that if the USPS will agree to "cooperate" with his company, its opposition to Intelpost will fade away.

Underlying Knapp's remarks was a fear, expressed often in the past by the carriers as well as commercial vendors of electronic message services, that the USPS wants to control the transmission portion of Intelpost service and that once established, this control will establish a precedent for similarly dominating Electronic Computer-Originated Mail, the domestic electronic mail service proposed by USPS.

Knapp's "principal point," he told the subcommittee, is that USPS international electronic mail services, "should be developed in cooperation with U.S. carriers both as a course of conduct beneficial to the U.S. balance of payments and also in order to lay the foundation, including the development of the hardware, software and the mechanics of interconnection, for Intelpost and other future cooperative international services offered by the Postal Service and communications common carriers."

Knapp added that "for many years, ITT World Communications, Inc. has sought to interest the Postal Service in a cooperative Mailgram-type service. . . . The Postal Service has consistently refused to enter into any such arrangement. . . . Its asserted reason was the existence of arrangements with Western Union for domestic Mailgram service and its desire to deal with a single U.S. telecommunications carrier."

Seminar to Focus On Improvement Of Productivity

NEW YORK — Beefed-up information transfer techniques and a stronger management commitment to technology can boost white-collar productivity by as much as 20% and cut operating costs by another 20%, according to figures recently released by a Massachusetts-based market research firm.

The Yankee Group will sponsor a two-day seminar on using technology to improve productivity May 20-21 at the Harvard Club here.

Methods Analyzed

The seminar will analyze the methodology of measuring productivity. It is also designed to help participants build a two-tiered plan to improve productivity, according to the Yankee Group.

The firm's plan includes building a conceptual framework of a company's unique characteristics, both assets and limitations. The second tier is a plan to improve information transfer by improving a company's information processing technology, the Yankee Group said.

The seminar costs $650 per person and $550 for each additional person from a single company. The Yankee Group can be reached at P.O. Box 43, Harvard Sq. Cambridge, Mass. 02138.

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Chicken-and-Egg Question

Impacts of 'Office of the Future' Addressed

By Jake Kirchner
CW Washington Bureau

ATLANTA — Attendees at the Office Automation Conference here earlier this month were repeatedly exhorted to prepare themselves for radical restructuring of business organizations through office automation.

At the same time, however, visitors to the exhibit floor saw nothing but gleaming electronic boxes configured to meet present organizational needs.

This chicken-and-egg question of whether office environments will change to accommodate visionary business systems or vice versa offers the typical office worker the solace of knowing that the true "office of the future" is indeed some way off, according to several who addressed societal impacts of office automation at the conference.

It will be a long time, at the very least 10 to 15 years, before there are "dramatic societal impacts," according to Dr. Norman White of New York University's Graduate School of Business Administration.

Radical Changes

Beyond the fact that large business organizations do not like to change rapidly, society as a whole is "self-monitoring" when it comes to radical changes, White said.

And society has been continuously faced with radical change for centuries, not just since the advent of electronics, he added.

He agreed with other members of a March 4 conference panel that the effects will indeed be tremendous over the long run. However, what those effects will be was hotly debated by the panel, other speakers and the attendees throughout the three-day conference.

Worker Displacement

Because of office automation, "we in the U.S. are facing massive layoffs," one speaker said. Every new product in the field carries, directly or indirectly, the vendor's claim that the new machinery can trim company payrolls, according to another conference goer.

Several respresentatives of various manufacturers, however, maintained office automation generally leads only to more productivity, with the same employees accomplishing more with the same or less effort, and has no great impact, one way or another, on unemployment statistics.

The truth is probably somewhere in between those two positions, according to White and fellow academicians who addressed the conference. Predicting the true impact of office automation is like telling the future, they suggested.

Nevertheless, White and his colleagues took a stab at it, saying, on the other hand, that what is really wanted at this point are not predictions so much as an identification of avenues for further research into the effects of the office of the future on society in general and on office workers in particular.

According to Dr. Sidney Harris of Georgia State University, educational institutions need guidance on designing curricula for training managers of the future.

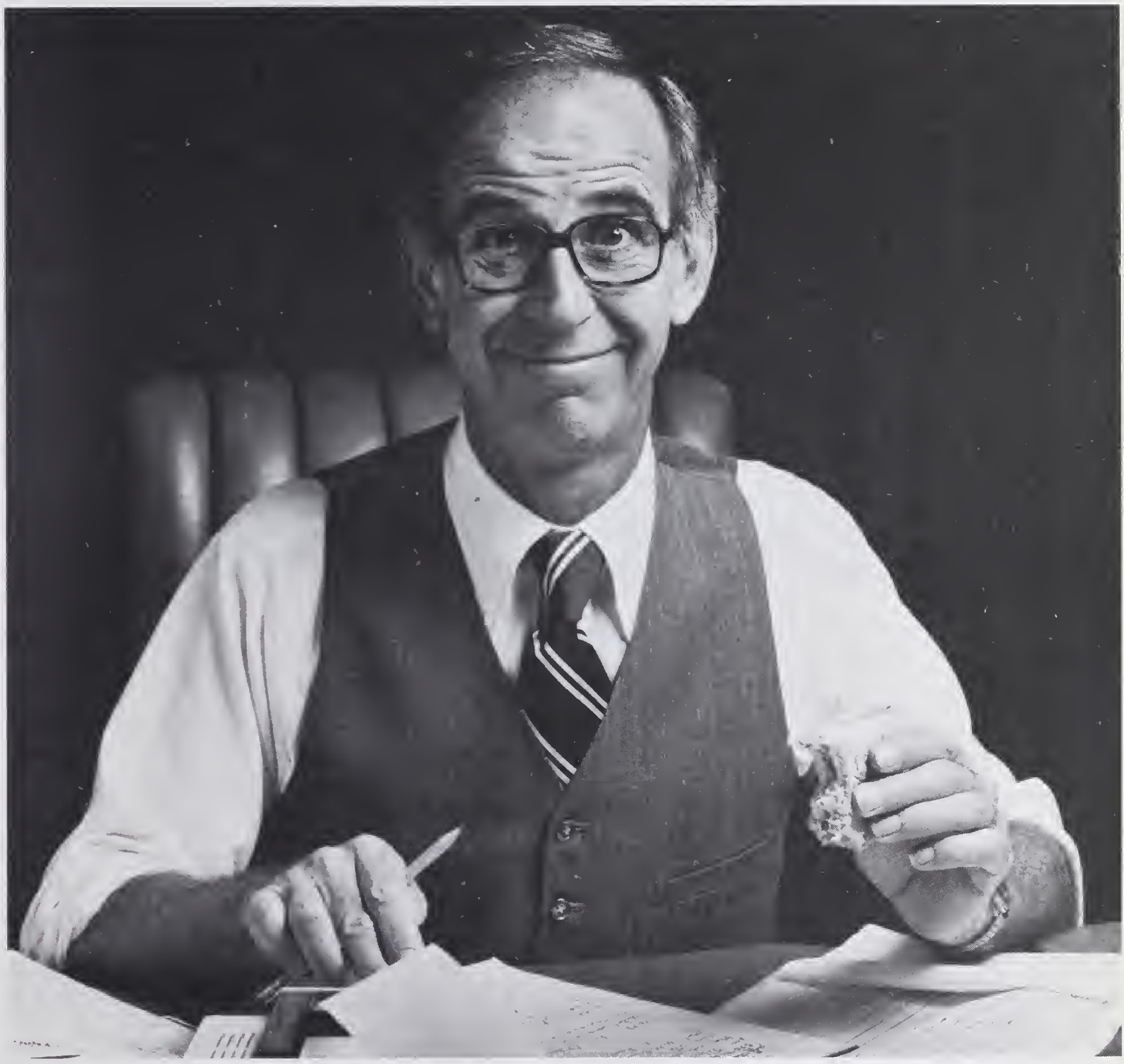
Management Functions

Because of office automation, there will be a redistribution of the management function in business organizations, Harris said. A manager will have more involvement in dispersed areas of the organization through the rising use of telecommunications.

This will call for new management functions — information resource, communications and administrative services management, to name a few — to be performed by the average, mid-level executive.

In fact, this prediction of Harris's may already have been borne out. Many of those who attended the conference were members of DP staffs who have already become involved, in some cases extensively, with other parts of their organizations through their roles in introducing word

(Continued on Page 15)



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IBM Seen Hiking Prices To Sustain Growth Rate

SCOTTSDALE, Ariz. — IBM will continue to use pricing hikes to sustain its annual 14% to 15% growth, according to Ulric Weil, vice-president of DP research for Morgan Stanley, a Wall Street firm.

IBM's earnings are very sensitive to sales. If DP sales do not go up in a particular year, earnings are almost certain to drop, he told the Future Systems Forum II conference here recently.

And if IBM perceives a slower than desired growth, it is likely to raise prices to get its growth rate to the 14% to 15% level, he suggested.

Although IBM's software services sector is growing fast, it does not amount to enough revenue yet to significantly alter the company's growth.

The main factors that can make a difference are the proportion of machines on rent vs. purchase and the pricing of such products, he said.

Impromptu Survey

IBM does not have complete control of its environment, as an impromptu survey of attendees illustrated. After asking the audience a series of questions on acquisition plans for Series 30 systems this year, Weil concluded that there is enough "rumor mongering" about forthcoming IBM products — such as the H series — that users are not very willing to commit to purchase of the Series 30 products.

Weil, incidentally, does not think H will be announced until 1981.

If such an attitude is an accurate perception of the marketplace, IBM may again find a larger than desired percentage of its shipments are on lease. In that case, IBM might be prompted to raise prices, Weil said.

"IBM can raise prices and I believe they'll do it again . . . and again. Once they get onto something they usually do it for awhile," he added.

Japanese Market

Ironically, although IBM is very vocal on the subject of Japanese participation in the U.S. DP market, a price raise would in fact be helpful to the Japanese, Weil noted, because they are about the only segment of the market that will not follow IBM's lead in raising prices.

In Weil's impromptu survey, of the 20 users with 3033s and Ns on order for 1980 delivery, only four plan to purchase or lease from a third party. And about half of the 29 users with 3033s installed are on either term lease plan or monthly availability charge from IBM.

Only one indicated plans to convert to purchase this year.

In another round of questions, Weil ascertained that Series 30 users expect they can absorb an annual average growth rate of between 25% and 30% in terms of millions of instructions per second during the next five years.

These users estimated their direct access storage device needs will grow at about 30% to 35% annually for the next five years, outpacing their CPU needs.

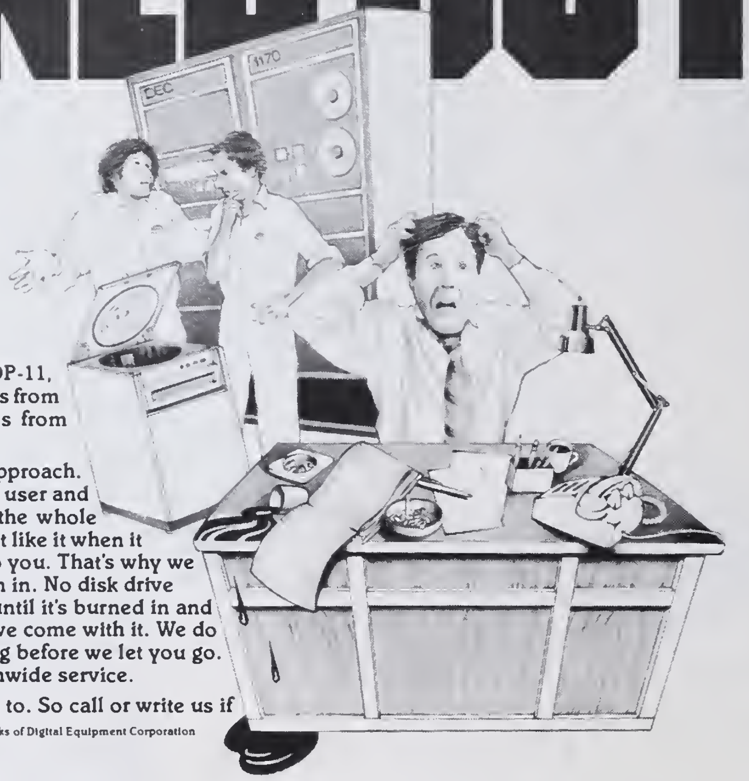
High Expectations

Weil told the audience that their expectations for usage are not as high as those used by IBM planners.

For instance, a 45% annual growth rate at 25% average annual price/performance improvement results in a revenue growth of not more than 10%/year. And as Weil had shown, IBM plans on a more hefty growth rate.

"The problem is you underestimate what the manufacturer is going to make you need or want. You don't know what cycles you'll need to implement the operating system or programs you'll be using," he commented.

"You don't know whose hands you're in."



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Hotline Seeks Communications for Disabled

BEAVERTON, Ore. — A customized CRT that has a player piano-type apparatus with a braille program. Another CRT that features both written messages and pictures for the hearing impaired.

These are two examples of the kind of communications equipment a group of handicapped people here are trying to secure through the use of a hotline.

The Special Interest Group on Computers and the Physically Handicapped (Sigcaph) set up their hotline primarily for employers of the blind, deaf or motor-impaired. It tells the employers what kind of special communications equipment is available, where they can find it and other handicap-related information.

By obtaining such equipment, employers can fulfill their equal opportunity employment obligations and give handicapped people the chance to realize a fuller, more productive life.

Since the program was initiated March 2, things have been going "pretty good so far," according to Beverly Bailey, assistant public relations director at Tektronix, Inc. and a participant in the hotline program.

She added that she expected the number of calls to pick up as word of the hotline was circulated.

The hotline number is (503) 357-4354. Incoming calls on it are monitored by an answering service and collected twice a day at noon and 5:00 p.m.

'Office of the Future' Envisioned

(Continued from Page 13)

processing technology.

The manager of the future, Harris added, will be overseeing a work force that will have to be better educated than today's in the basics. Despite electronic aids such as calculators and prompting word processors, the average office worker will still need to be more skilled in spelling and arithmetic.

Because of increased use of electronic equipment, those who will operate office machines of the future will have to be more precise, he said.

Workers will need a familiarity with and acceptance of the role of computer technology, Harris remarked. Electronic games and home computers are leading in that direction, but the real catalysts, as some at the conference suggested, will have to be in grade school courses in automation.

Managers may be reluctant to operate in this kind of environment, Harris said. They will have to show a willingness to accept and manage increased spans of control.

Managerial Image

But there will be trade-offs. As seen by White, the manager of the future will have to be smarter and write better because, through telecommunications, he will have less "face-to-face communication" with his coworkers.

As a result, there will be less call for the "managerial image" of the well-spoken, well-dressed, slightly aggressive executive of today.

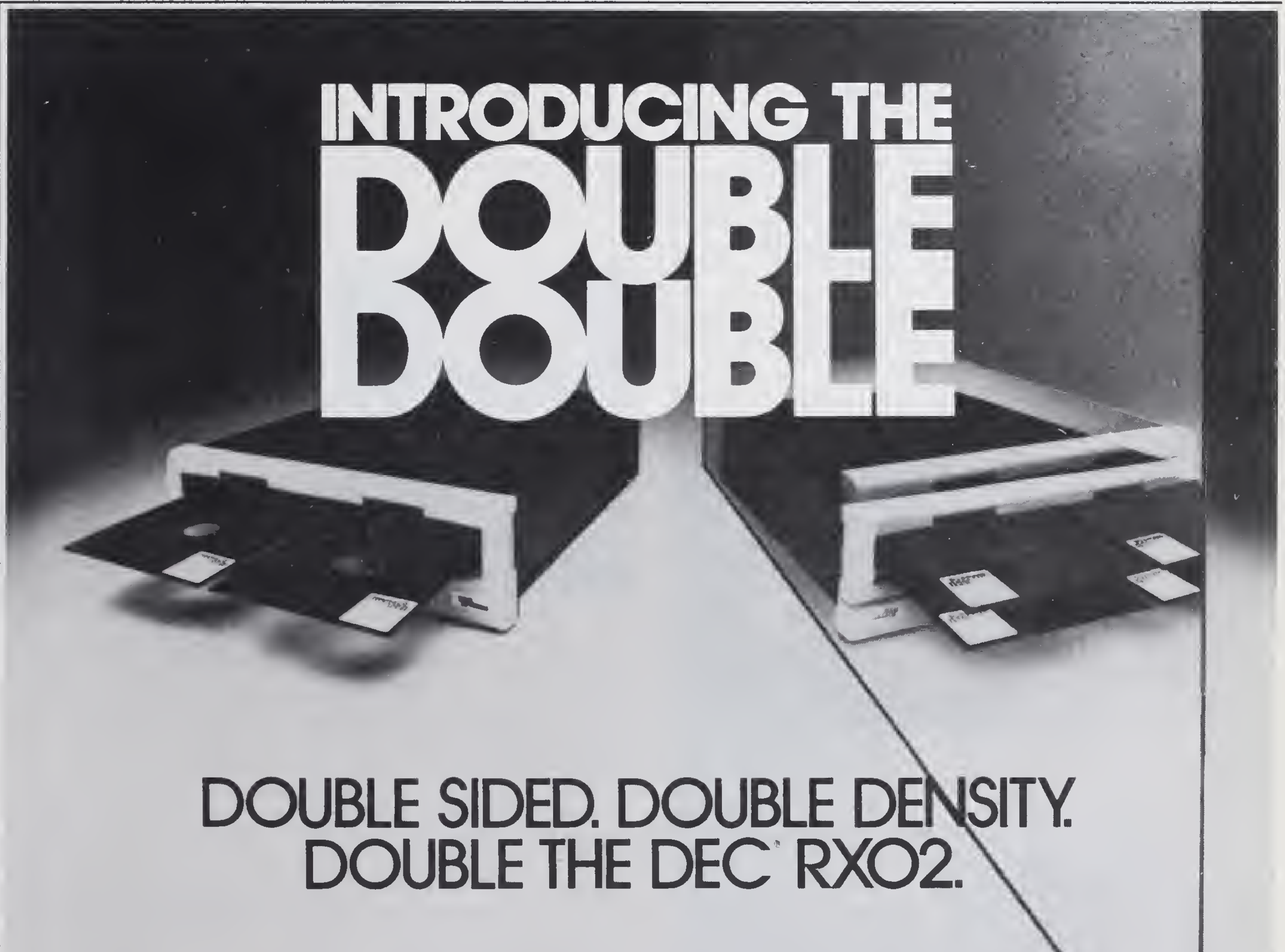
There will be less emphasis on how a person looks and speaks, and certain groups of people, such as the handicapped and minorities, will be afforded greater career opportunities than presently available to them, White said.

Home Offices

Inevitably, the image of every employee working from his home with CRTs came up often at the conference, with the usual conclusion being that the idea is on the whole not very attractive.

Only certain types of people are suited to that kind of life, White, Harris and others agreed. Social interaction is too important to the psychic well-being of the average worker and, consequently, to the economic well-being of the average business organization.

But the trend, as seen at the first annual Office Automation Conference, is definitely in that direction, to increased fragmentation of traditional office and, eventually, societal structures.



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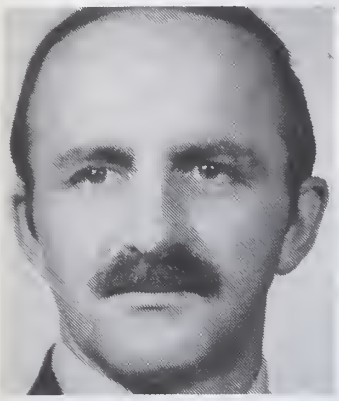
Managers on the Move

MAX ROBERT BORNER has been named manager of internal systems in the Data Services Division of First Atlanta Corp. in Atlanta.

Borner was previously manager of systems development at Computer Management, Inc., the DP subsidiary of Gold Kist, Inc. As manager of internal systems at First Atlanta, he is responsible for all internal DP systems.


Max Robert Borner

Borner graduated from Chur College and Poly Tech in Zurich, Switzerland, with a mathematics degree. He also completed the Montessori Teachers Training in California in 1968.

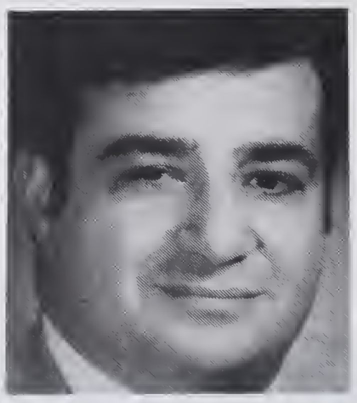
• • •

PETER P. MURGIA has been appointed assistant manager of operations and GARY A. SCOTT has been named assistant manager of systems planning and implementation at Bethlehem Steel Corp. in Bethlehem, Pa.

Murgia joined Bethlehem Steel in 1965 and advanced through several positions until he was named assistant manager of systems and programming in 1978, his most recent appointment.

Scott was employed by Burroughs Corp. before joining Bethlehem Steel in 1965 as an engineer in the Research Department. In 1970 he was named technical adviser in the accounting department's corporate DP division.

He was promoted to assistant manager, planning and control, in 1974, the position he held until his current appointment.


Peter P. Murgia

Scott holds a B.S. degree in electrical engineering from Lehigh University.

• • •

Gary A. Scott

MARTIN A. HUPKA and MANFRED C. HELSPER have been named secretaries in data processing systems at the Hartford Insurance Group in Hartford, Conn.

Hupka, director of the newly created Information Resource Management Division, joined The Hartford in 1975 as a systems manager and was promoted to assistant director in 1978 and assistant secretary in 1979.

He is a graduate of Pennsylvania State University.

Helsper, director of the newly formed Actuarial Services Division, joined The Hartford in 1956 as a member of the Canadian department in Toronto. He moved to the home office as a systems analyst in 1969.

Helsper advanced to senior systems analyst in 1971 and was promoted to assistant director of property and casualty systems in 1972. He was elected an assistant secretary in 1974.

• • •

DOUGLAS B. NETHERWOOD III has been elected assistant vice-president and director of DP at Aztech Corp. in Washington, D.C.

Netherwood went to Aztech in 1977 from American Management Systems, Inc., where he served as manager of systems administration.

He holds a B.A. in business and public administration from the University of Maryland.

• • •

RICHARD G. ZECH has been named vice-president of technology and business systems at McGraw-Hill Information Systems Co. in New York.

Zech will be responsible for identifying and defining strategic needs for advanced technology and computer business systems and for directing the company's operating divisions and staff departments into new areas of systems use.

Zech joined the company in 1979 as director of communications systems and subsequently became director of technology. Prior to joining McGraw-Hill, he was director of business development for optical processing systems at ESL, Inc. of Sunnyvale, Calif.

Zech holds a B.S. degree from Lawrence Institute of Technology in Michigan and M.S. and Ph.D. degrees from the University of Michigan, all in electrical engineering.

Martin A. Hupka

Manfred C. Helsper

• • •

DUANE M. BERGLAND has been named manager of data services for the North American Sales Division of Allis-Chalmers Corp.'s Agricultural Equipment Sector in Milwaukee.

Bergland holds a bachelor's degree in mechanical engineering from South Dakota State University.

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He Was Getting Ready to Retire, But the SSA CPU Said 'No Dough'

By Tim Scannell
CW Staff

JUNCTION CITY, Ore. — Mervin Rossow, now a janitor at the local elementary school, has been working for 36 years. Not too long ago the former roofer and farmer began to look forward to retirement — and his Social Security benefits.

When the 62-year-old Rossow ventured down to his local Social Security Administration (SSA) office to check on his nest egg, however, he was told he had nothing coming to him.

According to the SSA's computerized records, the only income Rossow had to show for nearly four decades of labor was about $3, reported to the government back in 1937. Anyway, that was all the SSA's IBM and Univac multi-mainframe system in Baltimore contained on him.

"They asked me to bring my card in and they looked at it and were really puzzled," Rossow said. "They asked me if I had ever gotten a new number at some time, but I never had."

However, after a bit of computer back-tracking and double-checking, sleuths at the Baltimore office finally unraveled the deduction mystery. When Rossow, then about 15 years old, took a job for a few days in a bordering town, his temporary employer applied for a Social Security number on his behalf, surmised Roger Warren, the assistant manager of the SSA's Eugene, Ore., branch. The employer sent the SSA what he thought were Rossow's necessary statistics, getting everything right except his birth date, which was off by two years.

Although the employer meant to send Rossow his SSA card and number, he never did. About nine years later, Rossow applied for what he thought was his first number; because the birth dates on the earlier record and the new record didn't match, he was issued a second card and a new file was started, Warren said.

Thus, a few weeks ago, when he checked on his contributions, Rossow was told he had nothing because the computer spotted the first file and not the second.

Unusual Case

Now that things have been straightened out, Rossow can again look forward to retirement and a monthly check, according to Warren, who said cases such as this are unusual. Although it wasn't required back in the early days of the Social Security program, people who apply today have to show a birth certificate and proper identification, which minimizes errors.

But the seeds of confusion are nonetheless there, Warren explained. According to recent figures, the SSA has about 300 million records in its files. And among these records are more than 1.6 million people with the surname Smith and several names that can be spelled at least 44 different ways.

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ABA Tests Not Returning Canceled Checks

By Tim Scannell
CW Staff

WASHINGTON, D.C. — The American Bankers Association (ABA) will launch a long-planned pilot test later this year designed to cut down the flow of canceled checks and save the banking industry an estimated $1 billion annually.

Under the program, banks will electronically signal other banks that a transaction has taken place and a check has been received, rather than return the canceled check to the originating bank or sender. The transaction signals will be sent between computers over a direct line or stored on magnetic tape for later retrieval, depending on each bank's capabilities.

Only a handful of banks will initially participate in the check truncation project. Eventually, however, 43 institutions across the country will take part in the pilot test which is scheduled to run for about 18 months from the time it is fully operational.

During the experiment, test transactions will be limited to high-volume, low-dollar corporate transactions and will not involve low-volume noncommercial accounts. Participating banks essentially will deal with company-issued dividend checks, 86% of which usually amount to $300 or less, according to Gerard F. Milano, the ABA's associate director of operations and automation.

When a company dealing with a pilot-involved bank issues a dividend check to a stockholder through that bank, the check will be sent out in the usual fashion. If the stockholder cashes the check through a nonparticipating bank, the canceled form will be sent back to the originating institution and forwarded to the company.

However, if the stockholder cashes the dividend check at a pilot-participating bank, that bank will recognize the check as part of the program because of a special code written on its surface in magnetic ink. That bank's CPU will electronically signal the originating bank that the check cycle has been completed or output the same information to magnetic tape.

The originating bank will then send the company a bimonthly, weekly or even daily statement listing all of the completed transaction signals received by its computer.

Customer companies will get a copy of the canceled check only if it is requested. "The notion is that on large-scale corporate accounts, they already know who the payees are [and] they know the amounts of the items," Milano explained. "All they need to know is whether the item has been paid."

Currently, U.S. banks process and transport about 40 billion items per year, including canceled checks, at a cost of approximately 25 cents per item. Using computerized methods that do away with the physical return of checks will substantially reduce the cost of telling a customer that a transaction has been completed, the associate director added.

Both Sides of the Street

As participants in the project, banks will have to play both sides of the transactional street in order to make the system work, Milano pointed out. For instance, a bank cannot just send electronic signals and not store checks or just store checks and not notify other banks.

The ABA was quick to note that the focus of the project is not to speed up the check clearing process, but to make the present paper system — considered in banking circles to be the most efficient in the world — run a little more efficiently.

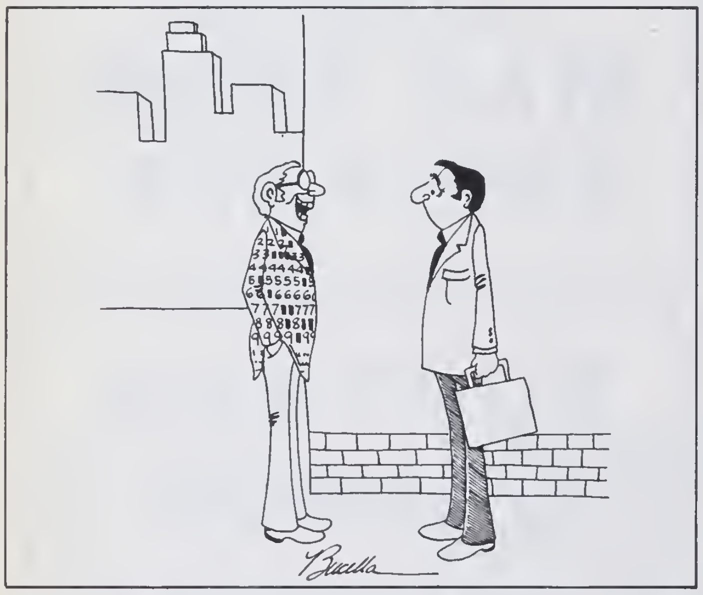
Presently, the Federal Reserve Bank has an experimental program designed to decrease the flow of paper and speed up the payment of large-dollar items. Canceled checks are shipped by banks, but at later dates to avoid inclement weather or peak travel times.

Cutting Paper Flow

"Our program focuses on getting paper entirely stopped and [the Fed's] is focused on reducing the cost of check handling by slowing down the paper flow without slowing down the flow of payments," Milano observed.

At this time, the only foreseeable roadblock to check truncation and eventual storage of all a customer's checks is both bank and customer acceptance of the program, Milano said.

The concept is not new, he noted. Banks did not start returning checks until about 1900, primarily because they ran out of storage space.



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At Security Analysts' Conference

Heavy Demand for Integrated Systems Predicted

By Brad Schultz
CW Staff

NEW YORK — The smart money is on integration — the trend towards merged DP, word processing and telecommunications technologies — according to speakers at a security analysts' conference here recently, who predicted a huge user demand for integrated systems in the years ahead.

Users would definitely benefit from a minicomputer-based"supercontroller" to administer merged data, voice, video and facsimile channels and assimilate disparate protocols and device types, some speakers said. That assertion was aired at several other communications conferences in recent months [CW, Feb. 18].

Addressing "The Revolution in Telecommunications," the New York Society of Security Analysts featured presentations from the computing community's vendor, academic and consulting sectors. A few speakers expected many users to link their branch facilities both with central headquarters and each other through a network that supports most types of office information flow and most types of equipment that process that flow. Rising energy costs and white-collar underproductivity were cited as the reasons.

The supercontroller is the key to consolidation of information channels and how they are administered, according to Daniel S. Hosage, a senior vice-president of Datapoint Corp.'s Office Systems Division.

Without such a system, Hosage said, users will be hard pressed to coordinate the multitude of data terminals with varying levels of intelligence and the increasingly sophisticated message switches now proliferating.

Without integration of data, word, voice and other information flows, corporate management will lose control of outlying functional groups, face difficulties in adapting to changing markets and economic conditions and experience more frequent communications breakdowns, Hosage maintained.

Reducing 'Information Float'

Many users will digitize the various information flows generated by their organization and funnel the bit streams through the supercontroller, Hosage continued. This process would "vastly reduce information float," tighten controls over cost allocation and generally improve management responsiveness.

As an example of how "information float" afflicts many users, Hosage noted that a "major New York user" needs 2.5 days, on the average, to send mail from one person to another within a department. The same user typically needs 3.5 days to send mail between departments and five days for mail between branch offices across the nation.

Products now exist that would cost-effectively allow that user to transmit its mail in digital form tens of thousands of times faster, the Datapoint executive indicated.

Incentives for Business

Greatly enhanced mail turnover rates would be a major benefit for any user, he added, because "businessmen are not getting enough information about the costs of operations" within the time frame necessary for prudent decision making.

In general, users need to see strong evidence of dollar savings before they will implement electronic mail networks, Hosage observed. One way such savings might accrue is through a reduced demand for labor.

At present, about 15% of a typical large corporation's mail is hand carried by secretaries, Hosage explained. With electronic mail, a firm might trim its demand for such workers or use them more productively elsewhere.

Other Network Components

Electronic mail is just one component of the integrated office network Hosage envisions. Other components include:

- Data processing. The advent of decentralized DP entails an unprecedented capability for off-loading applications from central processors to dispersed systems or intelligent terminals.
- Word processing. Reports and other documents will be generated at CRT terminals located on the desks of virtually all professional workers.
- Data communications. The integrated office worker will have remote job entry and other remote processing capabilities.
- Remote monitoring. The worker will also have an unprecedented capability for monitoring remote functions by receiving up-to-date numerical information through the network.

Reducing Transportation Needs

The integration trend may help the nation reduce its demand for fossil fuels, one of the most critical and inflation-ridden types of commodities, according to Harry Edelson, an analyst for the brokerage house of Drexel Burnham Lambert, Inc.

By giving the typical office worker vastly extended powers of communication, companies would sharply reduce their transportation needs, Edelson pointed out. Instead of relying heavily on airlines and the automobile as a means of conveying information from one place to another, firms could pipe the bulk of their information traffic through telephone lines.

Dean Gillette, Bell Laboratories' executive director for corporate studies, agreed that this might very well reduce corporate overheads. But, he said, commercial petroleum consumption comprises only 2% of the nation's total oil and gas bill.

DP Learning Centers Planned

KILLEEN, Texas — Retired army officer Mark Cornell and a group of associates are attempting to put together what could be the first in a nationwide series of franchises aimed at increasing computer literacy and the general educational level of an estimated two million undereducated Americans.

The 45-year-old Texan and his partners refer to the project as a community computer-based learning center and hope to build the first such center here. At the present time, Cornell and his associates are still at what Cornell calls "ground level zero."

The program is intended to equip a central Texas educational center with microcomputers with programs downloaded from a larger host. These are to be integrated with videotape and video-disk media, forming the nucleus of a facility designed to address a wide range of educational deficiencies.

Optimistic Outlook

Cornell and his backers are optimistic enough about their long-term chances to be seriously considering potential hardware and software. Two hardware systems are under consideration.

The first is the Nestar Systems, Inc. Cluster/1 Model A, which will be used specifically for Apple Computer, Inc. microcomputers and is expected to be available in April. The Nestar would be convenient because Cornell's group has applied for a dealership with Bell and Howell, which markets Apple computers.

That system comes with proprietary software and handles up to 64 microcomputers in a network. It is that proprietary software that has given Cornell and his backers cause to consider an Integrated Business Computer, Inc. (IBC) System 40.

The 128K-byte System 40 would be convenient because Cornell's group is already an IBC dealer. However, the group would have to write its own networking software.

The number of microcomputers the network will support depends on the nature of the software written for it, he added.

The group sent out more than 400 inquiries describing the project and soliciting market information. Cornell said that only two of the 45 replies received so far have been helpful.

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ARVADA, Colo. — A programmed self-study series called "Designing Structured Programs" presenting the Warnier-Orr data structured design method, a program development technology, is being offered by Educassettes, Inc.

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Inflation Takes Toll On University Network

OMAHA, Neb. — The University of Nebraska's computer network has temporarily fallen on hard times because of the ravages of inflation and a change in the way computing budgets are allocated.

Involved is a system comprised of approximately 200 terminals at two campuses in Omaha and Lincoln and a medical campus here, connected to an IBM 370/158 and a 360/65. The network administration had been given all the money it required to serve the campuses' computing needs, and the campuses "bought" computing time by using credit established in each of their names.

Beginning three years ago, the university decided to give the money directly to the campuses, with the understanding that the funds would be used to buy computing services, according to network director Ernest Kovaly. This approach worked until inflation took its toll on the campus budgets, forcing the campuses to use money originally targeted for computing to cover other expenses.

The network was used less, cutting the revenue the network expected to collect to meet its own expenditures.

Revised budgets are being prepared for submission to the Nebraska Board of Regents and eventually the state legislature, so the campuses can have the money they require to purchase computing time, Kovaly indicated.

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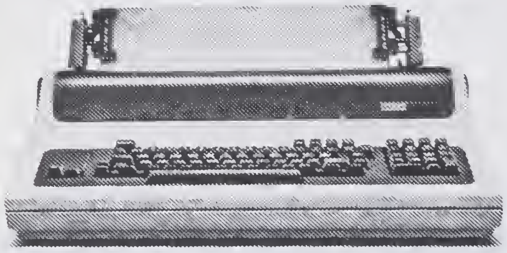

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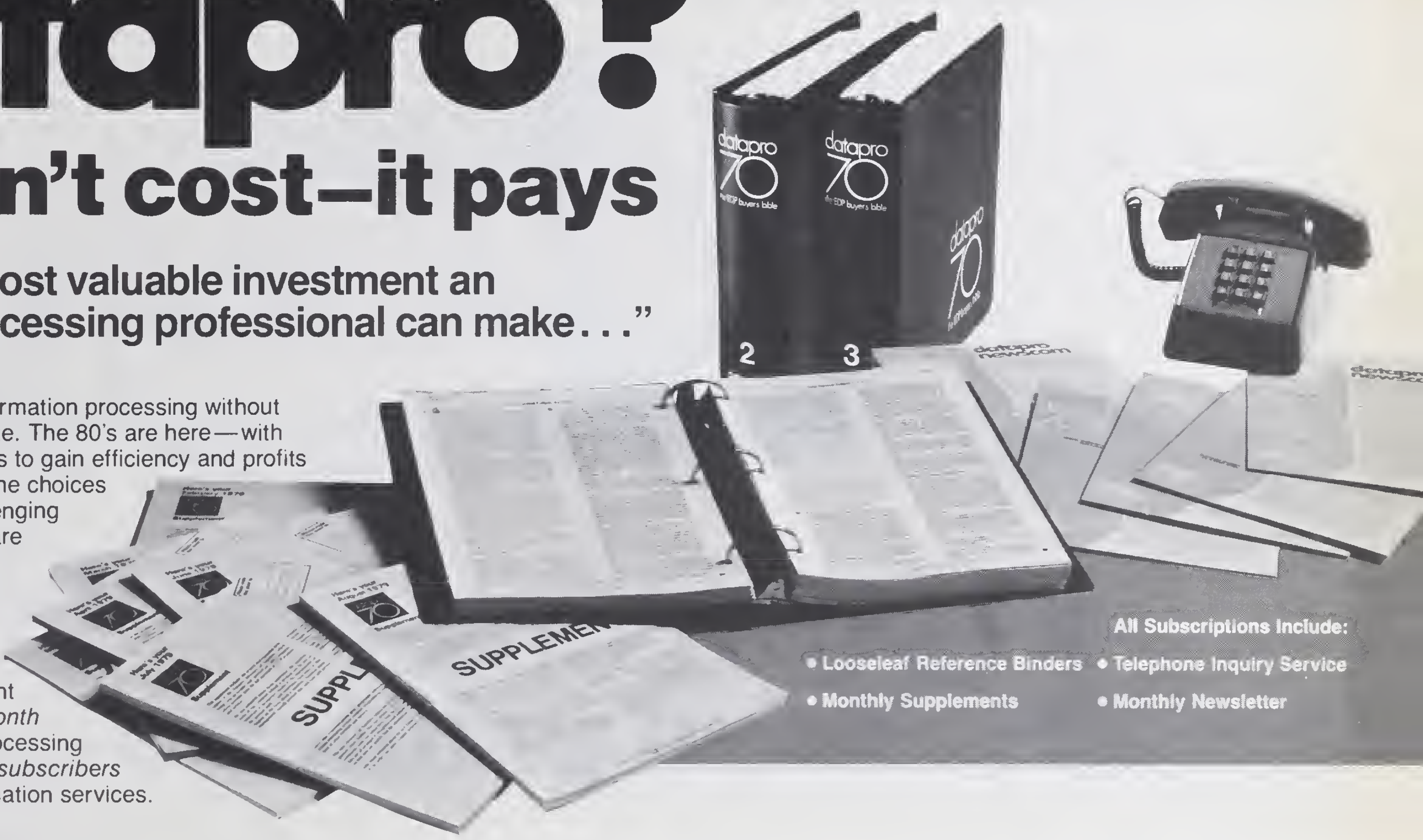

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Swedish Researchers 'Read' Photos by Computer

STOCKHOLM, Sweden — The Royal Institute of Technology in Stockholm is doing advanced research in computer analysis of photographs that is expected to facilitate the future study of natural resources, medicine and engineering.

The impact of industrial pollution on forests, cancer diagnosis and the detection of stress in building construction are three areas where the research may be applied.

The institute is using Univac V77 minicomputers supplied by Saab Univac to distinguish information in pictures which the naked eye cannot see without the aid of special instruments.

The primary emphasis of the research is in measuring light, which directly provides information from atoms and molecules as in the field of spectroscopy.

A minicomputer converts a picture into a series of digits and performs calculations on the digitized versions (photo left). In photo below, a CRT displays the gray tone scale values in an imaginary network of squares covering the picture.

Up to now, "the reading pictures by computers" technique had been limited mostly to remote sensing by satellites and some medical and technical engineering calculations, Prof. Nils Aslund, head of the institute's research project on image physics, said.

Before pictures are processed by a computer, they must be "digitized." A computer can then obtain information from these pictures by performing a series of calculations upon these digitized versions. The digits represent the gray tone scale values in an imaginary network of squares covering the picture.

"When the picture is read into a computer and processed by means of digital image analysis, all of the characteristics in the picture can in principle be expressed in quantitative form — thus providing a completely objective assessment of the picture, Aslund said.

Aslund noted that both black-and-white and color pictures can be processed by a computer. The black-and-white pictures can be presented in the form of color pictures on a television screen after processing.

Reconstructing the picture with "false" colors (known as pseudocolors) simplifies the eye's task in detecting minor differences in nuance, he explained, because the eye views color tones much easier than gray tones.

Special Equipment

An ordinary television camera can be used in many cases for reading a picture into the computer. But equipment of a different kind is needed to meet high accuracy requirements.

To cope with this need, a special type of machine, known as the Image Reading Instrument System (Iris), is linked to a Univac V77 minicomputer. Iris was built by the research group at the institute in collaboration with engineers from the Saab Scania Co.

In operation, reading a picture into a computer requires interplay between an operator, a measuring machine and the computer. In effect, the picture becomes a "memory" for the computer allowing the processor to have random access in two dimensions. The picture is available to the operator both directly and on the digital display screen.

General Applications

Because Iris is a fairly complicated and expensive machine, another device called Osiris has been constructed for more general purposes such as medical applications. One of the five Osiris machines currently in existence is used at the University Hospital in Uppsala, 40 miles north of Stockholm, where it is used to study microscope pictures of gynecological cell specimens to detect cancer.

The technique is also of interest in the engineering sciences, such as studies of stress conditions in bridges and other structures, and the measurement of vibration in airplane design. The stress or vibration becomes "visible" by means of advanced methods including laser technology.

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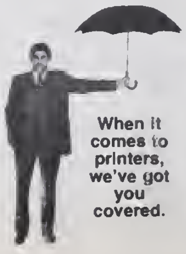

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As the Two Technologies Merge

WP, DP Managers Seen Coming to Blows

CHICAGO – The growing use of word processing (WP) will eventually bring WP managers in conflict with DP managers when the two functions are joined in the "office of the future."

That is the forecast of Vincent Deschamps, who spoke last month at a meeting of the North Shore Chapter of the Data Processing Management Association here. When DP and WP directors work together, information management will become more efficient, he said.

Anyone developing a WP operation with more than 10 users is likely to be developing a system that is in some way integrated to a firm's other information processing activities, such as electronic mail systems. This will bring WP planners into contact with those responsible for DP, and a struggle for control of WP may begin, Deschamps said.

Deschamps, president of Turnkey Sales and Leasing, Inc. of New York, said that although management is usually aware that WP and DP managers need to interact in order to perform their respective functions, they do not realize that the two are worried about where the control for each function should lie.

"To make matters worse, the WP director and the DP director often report to different people," Deschamps said.

A major problem is created when both sides assume they should have control. As a result, DP executives "are becoming wary about and pulling away from WP administrators," he said.

However, it is possible to shift from this tendency, Deschamps indicated. A major map publisher, for example, has a WP coordinator who reports to a DP director. WP requests are handled the same way as DP requests.

Systems Approach

"Systems design, application definition implementation plans and documentation requirements are followed for every WP installation," he explained. "It's more costly initially, but very effective and produces better results overall."

In this "systems approach to WP," hardware and software experts make the decision on what to buy while the WP coordinator is responsible for evaluating the hardware as well as the users' needs.

The WP equipment itself must be carefully evaluated by management to determine where it can be most effectively applied. The evaluation is important because microprocessor-based WP equipment with communications capability "is so powerful that deciding whether a job should be performed in a WP or DP jobstream is a real problem," Deschamps said.

Software Physics Topic of Seminar Starting Today

SAN FRANCISCO – "Software Physics and Capacity Management," a five-day course for those responsible for computer performance work load forecasting and equipment planning, starts here today at the Kyoto Inn.

The course, which runs through Friday, is designed to provide the necessary technical concepts and background needed to implement a quantitative computer capacity management program.

More information is available from the Institute for Software Engineering, P.O. Box 637, Palo Alto, Calif. 94302. it can be reached by telephone at (415) 493-0300.

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Man Accused of Rigging System to Steal Drugs

NEWARK, N.J. — Matthew De Filippo of Reading, Mass., was arraigned in U.S. district court here early this month for allegedly rigging the computer system at E.R. Squibb & Sons, Inc. to cover up a theft of $1 million worth of pharmaceutical products.

De Filippo posted $10,000 bail and was released on personal recognizance.

De Filippo, 34, is accused of orchestrating the scheme over a five-year period from 1973 to 1978, during which he worked for Squibb in Burlington, Mass., and Somerset, N.J. If convicted on the 10 counts of wire fraud with which he is charged, he could face a $10,000 fine and 50 years in jail.

During his employ as a computer operator in the Burlington distribution center from 1973 to 1977, De Filippo allegedly stole cases of pharmaceutical products and sold them to a "fence." He duplicated that process while working in Somerset, according to the indictment.

In both cases, he is accused of using his knowledge of the Squibb system to make the records show that the missing nonprescription drugs and other products were given away as samples.

De Filippo eventually rose to the rank of computer operations manager at Somerset before being fired in 1978. In Burlington, he supervised the computer system and transmitted invoices and reports to Squibb's centralized computer center in E. Brunswick, N.J.

De Filippo allegedly issued no-charge billings to Squibb house accounts by wiring false data to the E. Brunswick computer center. That process made up for the depleted inventory.

De Filippo will go on trial in U.S. district court here April 29.

Security Workshop Slated

WASHINGTON, D.C. — Twelve speakers will talk during 29 sessions at the 28th International Operational Data Security Workshop at the Four Seasons Hotel here March 31-April 3. The workshop is sponsored by Data Security Workshops, Inc.

DP auditing, the securing of operating systems and applications programs from manipulation and the use of cryptographic algorithms will be discussed. Several systems will be available for hands-on operation by attendees.

The fee for the workshop is $595 and includes four luncheons, refreshment breaks and a workbook which includes reference data.

More information is available from Robert J. Wilk, president, Operational Data Security Corp., 6 Swarthmore Lane, Dix Hills, N.Y. 11746.

Seminars Set On Net Planning

NEW YORK — Data network planners can develop their own expertise instead of relying on vendors with two seminars scheduled by Technology Transfer Institute.

"Computer Networks," scheduled here March 19-21, is designed to acquaint participants with the operation, design and performance of computer networks. It will also discuss packet switching, resource sharing and teleprocessing systems.

"Experts on Networks" will feature three network specialists who will cover the options available to network planners. It will be held March 24-26 in Chicago.

Registration costs $675, according to the institute at P.O. Box 49765, Los Angeles, Calif. 90049.

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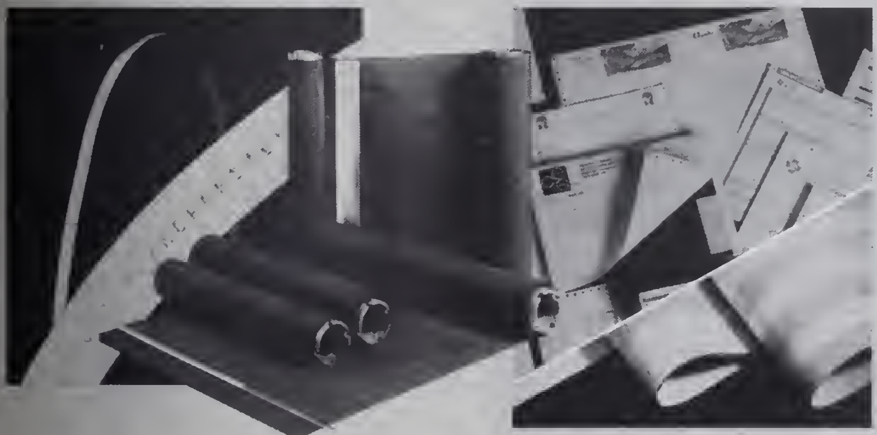

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Transition Staff Reports:

Education Department Studying DP Resources

WASHINGTON, D.C. — The recently created Department of Education has begun a study of the present state of its computing facilities so it can recommend how the department should structure its DP activities.

"We're now undergoing a kind of inventory analysis," Bob Cacchia, a member of the department's transition staff, said. "We have decided to see where we have redundancy in our computing and what information in one location should be accessible by another."

The transition staff expects to have the initial findings of the study ready for review in approximately three months. The results will provide the basis for an effort to coordinate and streamline the computing facilities that will be acquired when federal agencies concerned with education are brought under the new department's control.

Outside Services

The study will also show how much computing is now being provided by outside service bureaus to those agencies. At present, most of their computing requirements, including a federal student loan program, are being handled from without.

"We are not starting from scratch [to develop the department's computing operations], but most work is now done from the outside. When we determine what we are now doing, we will be able to decide how much we want to farm out," Cacchia said.

While the department was mandated by Congress to begin operation by June 3, Secretary Shirley Hufstedler, formerly a judge on the 9th U.S. Circuit Court of Appeals for 11 years, has indicated that she plans to have the department on its feet ahead of schedule.

Until it begins operation, all federal education programs will continue to operate under the authority of existing agencies.

ACM Meet to Feature Sessions On Making Data Bases Work

NEW YORK — Vendor presentations and technical sessions on making data bases work will be featured at the second Association for Computing Machinery (ACM) New York Regional Conference here on April 3-4 at the Waldorf Astoria Hotel.

Keynoter Edward K. Zimmerman, Deputy Assistant Secretary of Commerce for Communications and Information, will speak on "The State of Privacy Legislation — Where are we Going?"

Registration costs before March 20 are $75, $90 and $20 for members, nonmembers and students, respectively. After March 20, all but the student rates are raised $20.

More information may be obtained from ACM Headquarters, 1133 Ave. of the Americas, New York, N.Y. 10036.

ACM Opens Europe Office

NEW YORK — The Association for Computing Machinery (ACM) has opened a European secretariat in Amsterdam, Netherlands, to facilitate contact with members and potential members in Europe.

Inquiries regarding ACM membership, conferences, special interest group seminars and European chapters will be handled directly by the secretariat. Changes of address, complaints and requests for missing publications will be forwarded to ACM headquarters here for reply. No payments for membership, publications, subscriptions or renewals will be accepted by the secretariat.

The ACM European secretariat is at 40 Paulus Poetterstraat, 1017 DB Amsterdam, Netherlands.

Modeling System To Be Presented

PRINCETON, N.J. — An interactive computer-based modeling system for college and university budget and financial planning will be presented by Educom this year in San Francisco, Atlanta, St. Louis, Mo., and Quebec.

The Educom Financial Planning Model (EFPM) will be explained through a tutorial, demonstration and discussion in San Francisco, April 3; Atlanta, April 26; St. Louis, June 17; and Quebec, August 3. Daniel A. Updegrove, manager and designer of the EFPM Consulting Project at Educom, will lead the seminar.

The seminar costs $150 for registrants from Educom member schools, and $210 for all others. More information is available from Carol Parysz at Educom, P.O. Box 364, Rosedale Road, Princeton, N.J. 08540.

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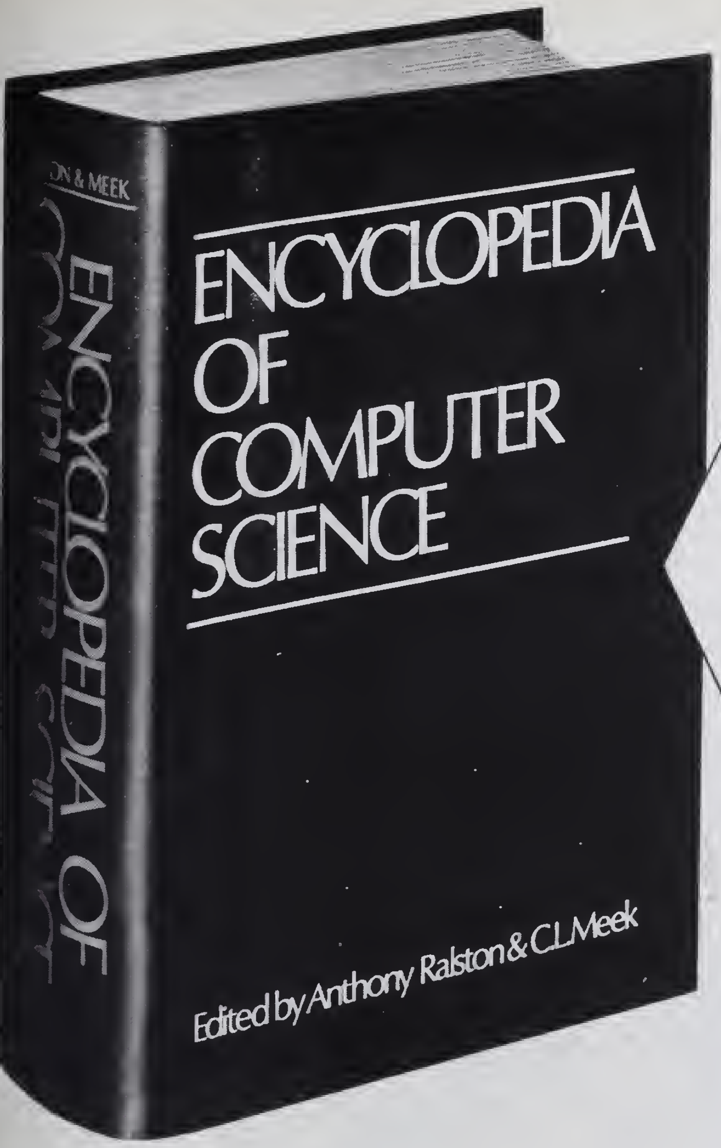

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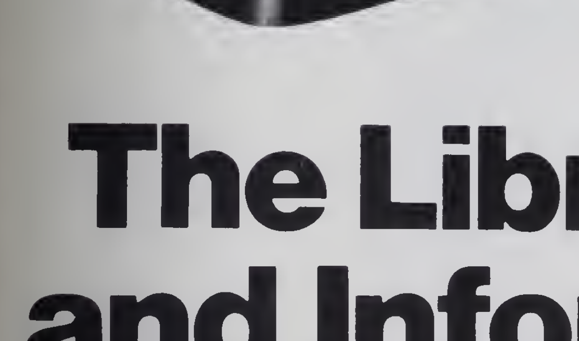

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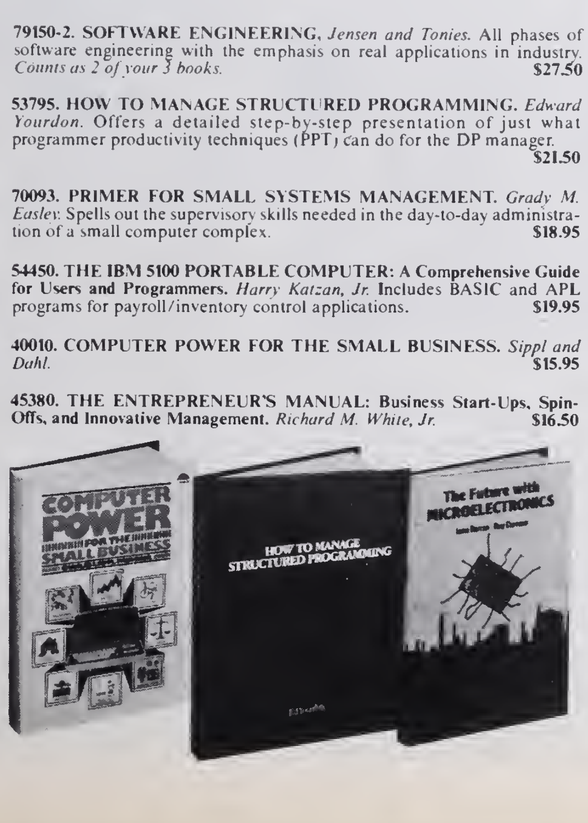

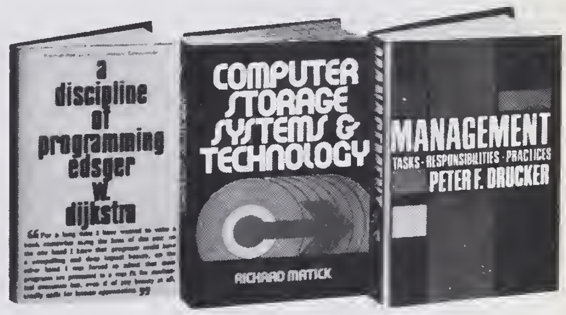

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Adapted for Cerebral Palsy Victim

Micro Enables Disabled Young Poet to Write

By Bruce Hoard
CW Staff

LONDON — A specially adapted microcomputer may turn out to be a literary wellspring for a gifted but spastic 14-year old boy from Dublin, Ireland.

The microcomputer, a Commodore Business Machines, Inc. PET, was adapted for poet and author Christopher Nolan by Phil Odor, a research fellow at Edinburgh University. The PET includes a keyboard, CRT, floppy disk recorder and printer.

Christopher suffers from severe athetoid cerebral palsy. He is unable to speak and has almost no control of his movements. It was not realized that he could read and spell until two years ago when a potent antispastic drug calmed him enough to let him choose keys on a typewriter.

Actual typing has been a tedious and laborious chore that the boy could perform only with the assistance of his mother.

Working at a conventional typewriter, Christopher wore a headband with a pointer attached to it. While his mother held his head, he directed the pointer to the key he sought. This relatively delicate maneuver was frequently interrupted by violent spasms.

The Sunday Times here — which printed Christopher's work last December — has mounted a drive to raise the 2,200 pounds (approximately $4,972), needed to purchase the PET system adapted by Odor.

The PET includes a word processor and stored dictionary. The machine allows the young poet several new luxuries — such as the ability to cancel words, store lines, select, reread and edit his material.

PET Operation

Operating the microcomputer is considerably less demanding than manipulating a typewriter. Christopher sits before it watching a globule of light scan rows of letters and symbols.

In order to select a row, he presses a specially designed switch with his chin. He then squeezes his knees together to stop the moving arrow at the letter he wants, which then appears in a sentence block on the screen.

In the event of a mistake, he simply cancels out the error and starts again.

Christopher has advanced rapidly on the microcomputer, which was loaned to his family by Software Development Services Ltd. He was able to write his name and store it after only two sessions.

More importantly, the number of possible permutations and combinations present a nearly limitless horizon bounded only by the young operation's imagination and mastery of the controls.

Parents' Reaction

His parents have been amazed — almost to the point of disbelief — by their child's new found prodigious talents. His mother flirts with the idea that Christopher is the reincarnation of a famous writer who squandered his talent in a previous life.

Joseph, his father and a psychiatric nurse, also believes that his son is possessed of some supernatural talent. Neither parent can figure out how a child incapable of even turning pages could ever have developed so replete a vocabulary.

No matter what the source of his gift, Christopher's writing is now a reality, and he has written an ode to the computer that made it all possible.

THE PET

My typewriter now is obsolete.
It's told of my tongue-tied genetic dreams.
Munificent mendicant hags
Spouted Cestus's loincloth.
Cannot the awful poverty ever be minimised momentarily
By a computerised friend?

(Cestus' loincloth was Aphrodite's girdle, which wakens the wearer to love.)

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Lecht and Davis to Speak At Federal Expo in April

WASHINGTON, D.C. — Two of the best known names in the computer industry will be featured at the annual Federal DP Expo here April 28-30.

Charles P. Lecht, founder and president of Advanced Computer Techniques Corp., will keynote the event at a luncheon on Monday, April 28. His topic will be "Riding the Technology Wave of the '80s."

Lecht has written numerous technical articles and five books, most recently *The Waves of Change.*

Dr. Ruth Davis, assistant secretary for resource applications in the U.S. Department of Energy, will address the Federal DP Expo Policy Luncheon on Tuesday, April 29. Her topic will be "A National Information Policy — Our Obligation to the '80s."

Davis has served as the director of the Institute for Computer Sciences and Technology in the National Bureau of Standards and was awarded the Data Processing Management Association's Computer Science Man-of-the-Year award in 1979.

One hundred computer experts will speak during the 39 planned sessions and more than 150 computer- and communications-related companies will hold displays on the exhibit floor. Up to 10,000 people are expected to attend.

Further information on the Expo is available from The Interface Group, 160 Speen St., Framingham, Mass. 01701.

Auditors Change Requirements For Certification

ALTAMONTE SPRINGS, Fla. — The Institute of Internal Auditors has reduced the requirement for professional experience and modified the educational criteria needed to attain certification as a Certified Internal Auditor.

Acceptable work experience can now include college- or university-level teaching in computer systems, auditing, finance, accounting or management, according to the institute. Two years of full-time teaching will be accepted as one year of experience in internal auditing.

Also, auditing experience in public accounting is now considered equivalent to internal auditing work experience, according to the institute's director of certification. A maximum of one year's experience will be credited for an advanced academic degree beyond the baccalaureate.

Since the inception of the Certified Internal Auditor program in 1973, more than 1,950 internal auditors have been awarded special certification by virtue of prior supervisory work experience in the profession or because they have had at least three years of work experience and have passed the institute's auditing examination.

The institute is located at 249 Maitland Ave., Altamonte Springs, Fla. 32701.

Users of SPSS Slate Meeting

ALEXANDRIA, Va. — Issue '80, the fourth annual users and coordinators conference for users of SPSS, Inc. software will be held here Oct. 5-8.

Sessions will focus on the firm's current and future software developments and includes topics such as interfacing SPSS and systems, statistical program consulting, commercial applications, alternative methods for teaching SPSS, data management, data cleaning, governmental applications and selection of appropriate algorithms.

Registration information is available from Steve Hamburg, Issue, Inc., P.O. Box 8224, Chicago, Ill. 60680.

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Are Your Job Descriptions Current?

Turnaround Time

By Larry E. Long

Q The Personnel Department just informed me it is downgrading seven of my operations people. Two are shift supervisors and the rest are operators. As it is, I can't keep anybody for more than about eight months.

Personnel says that according to its position descriptions, it can justify no more than a clerical-level salary. Is there anything I can do to reverse its decision?

A In all probability, Personnel is simply applying its criteria to your existing position descriptions. When was the last time you revised the position descriptions to reflect the true function and worth of your operations people?

In this volatile business, the position descriptions, like applications systems, must be continuously updated for this very reason. I'm sure there are many position descriptions for operations which still reflect jobs as they were in the days of electronic accounting machines.

Q We are in the process of writing the charter and establishing a management information systems (MIS) steering committee. The suggestion has been made that the existing executive committee, made up of 12 division heads, double as the MIS steering committee. Have you had any experience with this type of arrangement?

A Yes, It doesn't work very well. I assume that the scope of responsibility of your executive committee encompasses all phases of corporate operation, including MIS. Unfortunately, such committees often avoid the subjects of computers and information systems or give them a relatively low priority.

A well-written MIS steering committee charter will require the committee members to focus their efforts on MIS. In all probability, a select group of concerned division heads would make the best steering committee. A small working committee of five to eight high-level people can have an enormously positive influence on the direction of MIS.

Q I've been in charge of recruiting for our data center and in the last seven years I've interviewed thousands of young men and women.

When I ask students what type of exposure they've had to computers, programming and information systems, they invariably say they had a Fortran lab where they wrote programs on statistics, economic models and the like. In this day of automated recordkeeping and management information systems, do you think this is sufficient for the undergraduate student in business?

A I call this the "Fortran Syndrome." Professors who learned Fortran in their undergraduate days remain intent on teaching Fortran to their students now. Fortran is a good language, but it is not the most efficient approach to meeting the educational objectives of business students.

Only a very small percentage of those students graduating in the fields of business will ever write production programs. However, virtually all will be directly and/or indirectly involved in the development of some type of business information system, probably within the first couple of years of employment. The student needs a basic understanding of computer operations and limitations and perhaps a sympathy for the complexities of writing even a simple program.

In my opinion, the most efficient approach to meeting these objectives is to introduce the student to interactive Basic programming. Basic is widely used in small commercial computers today; on the other hand, Fortran is seldom used in business systems. Many universities have opted for this approach and have had nothing but success stories to tell.

Since Basic is much easier to learn than Fortran, the time saved in both teaching it and learning it could be applied to teaching the fundamentals of computer-based information systems, emphasizing capabilities from the user viewpoint.

Unfortunately, I've seen many college courses labeled "Fundamentals of DP" that are 100% Fortran. This is a disservice to the student.

Long is a professor at Lehigh University, a DP consultant and author.

Correction

In last week's column, the Data Processing Management Association (DPMA) was incorrectly identified as the Data Processing Management Society.

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Pride Users To Hold Meet

CINCINNATI — The North American Pride Users' Association, Inc. will hold its sixth annual conference on May 5-8 at the Tamarron Hotel in Durango, Colo.

Pride is the proprietary systems design methodology of M. Bryce & Associates, Inc.

Further information may be obtained from Walt Jarrell, Frontier Airlines, Inc., 8250 Smith Road, Denver, Colo. 80207.

Conferences Offer Writers' Training

WASHINGTON, D.C. — Concerned about your writing style? A consulting firm based here called The Writing Co. offers conferences on how to write clearly for high-technology industries.

The one-week conference is a combination of lectures identifying qualities of good (and bad) writing, interspersed with editorial sessions, writing assignments and performance reviews, a spokeswoman said.

Interested parties first meet with a Writing Co. representative to discuss their particular needs and goals. Special materials and writing exercises are prepared, based on participants' requirements.

Writing Samples

Students are required to submit writing samples a month before the conference to the faculty member who will act as their tutor during the week of the course and during the subsequent six months, through which the students continue to submit written samples for editing and critiques.

A successful graduate should be able to present organized and clear ideas on paper, producing written material that is "as accessible and precise as possible," the spokeswoman said.

Cost is about $700 per person for a group of 20 persons and a staff of five instructors. However, the course can be shortened or lengthened to suit the needs of the participants, the spokeswoman indicated.

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EDITORIAL

Bracing for WP

Word processing (WP) technology is the way of the future, and DPers should embrace its benefits while readying themselves for a sharp increase in its use.

As witnessed by a number of speakers at the recent Office Automation Conference in Atlanta [CW, March 10], DPers are increasingly called upon to oversee the introduction of WP systems into their business environments.

Since WP is so closely tied to data processing — and in fact many regard the two as merging — it is logical that non-DPers should regard WP as falling within the domain of the DP manager.

Now it is up to the DP manager to accept the externally imposed responsibility and to become ready and able to consult with users about the realities, benefits and limitations of the technology.

Instead of the natural tendency to resist change and maintain a comfortable status quo, DPers should welcome the WP challenge. Their foresight will be rewarded by increased efficiency and improved communications in their systems.

Not only can the combination of DP and WP improve the readability of computer output — thus increasing the usefulness of the very data processed by computer — but the two can allow storing and forwarding of letters and reports to be accessed only when needed.

In the area of remote job entry, on-line word processors can reduce the amount of time spent rekeying typed documents into computers and then typing up information from computer printouts.

In short, word processing is here to stay, and DPers should take advantage of its many benefits by welcoming the challenge of its implementation.

Plain-Speaking Advice

"Turnaround Time" by Larry Long is a new *Computerworld* column intended to provide some plain-speaking, practical advice for solving problems that trouble DPers.

Last week's column is a good example. In it, Long suggested several approaches to taking the Certificate in Data Processing (CDP) exam — one of which is to sit in the exam "semi-cold," see how much of it you can pass and study next year for the rest.

Readers are urged to send in questions about anything related to work in data processing. No problem is too small or too broad for Long to tackle. Some topics can be covered in a couple of paragraphs; others may take several columns — and several weeks!

Long, who is a DP consultant, a professor of computer science at Lehigh University and a CDP holder, has free reign to express his opinions. We may not always agree with him — you may not either. If that is the case, do not hesitate to write to him at our Framingham, Mass., office.

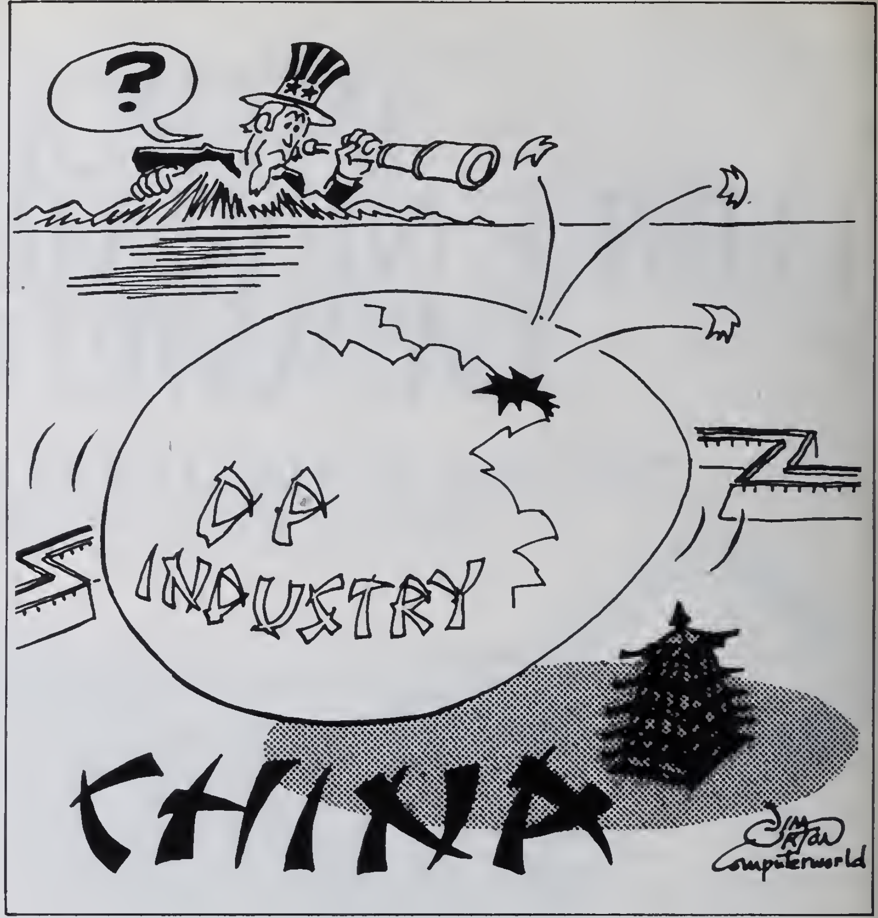
DATA PAST

Five Years Ago
March 12, 1975

SOUTHBORO, Mass. — Data General Corp.'s Eclipse C/300 data system was introduced for dedicated on-line operations within end-user departments of "medium to large 'Fortune 500' companies with considerable DP capacity and experience." The C/300 was not for the novice DP shop, and no turnkey applications were offered with it.

Eight Years Ago
March 8, 1972

WHITE PLAINS, N.Y. — IBM announced a programmable communications front-end processor that could operate with all 370 CPUs and most models of the 360 family. The 3705, officially called a communications controller, greatly expanded the capabilities of the 270X series. The 3705 could be used with most IBM terminals.



Bird-Watcher

LETTERS

Delayed IBM Products

Two recent *Computerworld* articles (Feb. 25, March 3) concerning software for the IBM 8100 Information System contained a number of inaccuracies which should be clarified.

Contrary to CW's report, the two delayed programs are not operating systems, but are program products used with the Distributed Processing Programming Executive (DPPX) operating system for application development. There has been no delay in delivering the IBM 8100 operating systems — the DPPX or the Distributed Processing Control Executive (DPCX). Both were available with 8100 systems delivered to customers in August 1979, as originally scheduled.

Last November, we did explain to customers that two program products, DPPX/Cobol and Development Management System/DPPX (DMS/-DPPX), would be available later than originally scheduled to permit additional integration testing. General availability of DPPX/Cobol was set for April 1980, and we announced that the availability date for DMS/DPPX would be set by March 3. That date has been announced: June 1980 for DMS/DPPX and December 1980 for DMS/DPPX Execution Facility.

Further, extended memory support for the IBM 8100 and DPPX/Host Command Facility (DPPX/HCF) has not been delayed, as CW reported. IBM announced support of memory capacity greater than 512K bytes on Nov. 30. At that time we also announced that up to 1M bytes of main storage would be available, along with extended memory support, for the 8100 in November 1980. The initial release of DPPX/HCF was available for shipment to customers Dec. 4, as originally announced.

Contrary to the implication in your March 3 article, IBM has, over the years, developed and delivered distributed processing products.

J.M. Gugliemi
Division Director
IBM Data Processing Division
White Plains, N.Y.

OTA Draft Report?

I am deeply concerned over a seriously misleading and inaccurate article, "H.R. 6121 Won't Curb Bell: OTA" [CW, Feb. 11].

The article repeatedly cited an "Office of Technology Assessment (OTA) draft report." The facts are that no OTA report on this subject — draft or otherwise — currently exists. The author quoted from a draft contractor report prepared for OTA by Future Systems, Inc. (OTA contract number 933-3860.0). Neither the contractor report nor its findings have been approved by OTA. The material may or may not be used by OTA in its report to Congress due in the spring.

The lead paragraph of the article stated that the so-called "draft memorandum" is "being circulated on Capitol Hill." The facts are that the contractor report was submitted to OTA in November 1979 prior to the existence of H.R. 6121. It could hardly be quoted, therefore, as saying that "major changes are needed in H.R. 6121"!

The draft report was distributed on Jan. 28 to members of OTA's advisory panel on this project, not to the Congress or to the general public. And it was distributed under the following conditions stated on the cover of the report: "The Contractor's report is provided for review and comment only. It has not been approved by OTA or the Technology Assessment Board."

The OTA process is an open one whereby we commission various con-

(Continued on Page 42)

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40 Public Utility/Communication Systems/Transportation
50 Wholesale/Retail Trade
60 Finance/Insurance/Real Estate
70 Mining/Construction/Petroleum/Refining
75 Business Service (except DP)
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85 Government - Federal/State/Local
90 Printing/Publishing/Other Communication Service
95 Other: ______

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21 Director/Manager of Operation/Planning/ Administrative Service
22 Director/Manager/Supervisor DP
23 Systems Manager/Systems Analyst
31 Manager/Supervisor Programming
32 Programmer/Methods Analyst
41 Application Engineer
42 Other Engineering
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80 Librarian/Educator/Student
90 Other: ______

Detach here, fold, and place in post-paid envelope attached through binding.

READER COMMENTARY/Tom M. Lippard

IBM's 4331: 'A Fantastic Piece of Equipment'

I'm of the firm opinion that you can't believe everything you read or hear, and that's my exact feeling on IBM's new 4300s and their software.

I can tell you from recent experience that the 4331 is a fantastic piece of equipment that has had no chance to prove itself in the DP industry. I've had the opportunity to sysgen a 4331 with the new FBA (3310) devices attached, and it's one sweet piece of hardware.

It all started in September 1979 when I went to work as a senior systems programmer for First Systems Corp. in Raleigh, N.C. The company operated on Honeywell, Inc. equipment and wanted to convert to IBM. Well, the hardware and software was ordered and installed; and as of yet, there are no major problems with either.

To fill you in a little further on our particular shop, here are the machine configuration and software products with which we are operating:

The hardware consists of a 1M-byte 4331 mainframe with the following attached: two fixed-block architecture (FBA) 3310s, four 3420 tapes at 6,250 bit/in., two 3340 70M-byte CKD drives, one 3203 Model 5 printer, one 3540 diskette unit and 28 Model 3278 terminals.

The software consists of DOS/VSE Release 1, Power/VSE Release 1, DOS/CICS/VS Release 1.4.1, the Interactive Computing and Control Facility (ICCF) Release 1, Advanced Functions, VSE/Vsam, Btam-ES, Cobol, Sort II, Video/370 and, of course, VSE/Ditto.

I will be the first to admit that we had some problems with the sysgen, but we've run across none that were unsolvable. Between my IBM service engineer (who is *one of the best* I've ever worked with) and myself, we have been able to fine-tune this system and make it sing a very sweet song for this company.

I cannot understand why everyone else is looking to other vendors and not taking the 43s. In my opinion (which is one in a million), I think the 4331 outperforms the 370/135 by a long shot and is much more efficient with the FBA devices attached; and as far as the software goes, I think it's much better than people realize.

Take ICCF, for example; IBM's VSE/ICCF is one of the best on-line programming packages on the market today, and the "price is right." With ICCF, you have all the facilities of the other vendors, plus some. Through ICCF, you can install other packages with minimal effort. There is no other vendor that I know of that will give you a package like ICCF for the price IBM does.

Another point I would like to bring up is the new FBA devices (3310s and 3370s). These new drives are the best to hit the market in years.

For example, my Sysres files (Core Image, Relo, Source, Proc) are using approximately 200,000 blocks of FBA space, which includes about 30% free space for future growth. If I were to use the 3340s for my Sysres files, I would need approximately 15,000 tracks. Believe it or not, I cannot restore my source statement library to a 70M-byte 3340, and it's only using 80,000 blocks of FBA space.

I've read most all of the articles in *Computerworld* about the 4300s and the VSE software and have confirmed once more that everything that is written cannot be believed.

Almost every article that has been printed looks to me like everyone is trying to degrade the 4300s and their software, and I think it's time someone spoke up in their defense.

I have worked with 360s and 370s, and after 12 years of DP experience, I think the 4300s are the best medium-sized systems I've had the pleasure and opportunity to work with.

I am exceptionally pleased with our 4331, its software and its overall capabilities.

HUMAN CONNECTION/Jack Stone

DP Mentality Can Benefit Business

A short while ago, I chatted with a senior marketing executive of a very large manufacturing firm that deals in high-technology products and services. When we touched on the subject of information systems, he indicated that his organizational unit was being supported by multiple mainframes operating in a loosely coupled multiprocessing configuration, but that it was scheduled to convert to a tightly coupled arrangement. The bugs in the sysgen processor were being worked on, he said.

He went on and on until I interrupted him with, "Hey, wait a second, you seem pretty knowledgeable about the DP business. Are you one of . . . us?"

This article is ninth in a series, "DP Management in the '80s."

"To the core," he replied. "I used to head up the information systems department, but quickly transferred to marketing when they offered me a vice-president's slot."

I shook my head and had to comment, "What's a nice young DPer like you doing, hanging around with a bunch of marketeers? Won't you lose your DP touch in a month or two?"

He told me a lot about why he made the switch and it correlated well with some thoughts I've had about DPers leaving their chosen career — at least temporarily — and transferring to a user organization.

Typical Qualities

Is there a DP mentality? Well, I think there are some valid generalizations that can be made about our mental characteristics — even though they doubtlessly do not apply to every single DPer. First, the DPer has a voracious appetite for data — systems, applications and support. The systems analysts and their group manager probably understand the overall process of managing the firm's business better than anybody else around, because they are continually submerged in planning, operational and evaluative data from *all* areas of the business and, upon demand, can quickly spew forth vast amounts of data.

Second, DPers have an unusually strong drive — call it "compulsion," for many of our colleagues — to seek out the really tough systems challenges and then proceed to solve them. Using my own case as an example, just last week I purchased a complex business system for my micro at a discounted price because there was no documentation, and I did so in part because I wanted to see if I could figure out how to operate it without the usual narrative explanation.

This attitude is hardly prevalent in the "mainstream" units of the organization. If the truth be known, our beloved users do not have a reputation for knocking themselves out to get their jobs done.

Third, DPers become infatuated with the information systems discipline early in their careers and build the relationship into a passionate love affair. It's hard to identify any professional group in our society which so commit themselves to their careers. And if we contrast our devotion to our duty with that of the users, the latter runs a very poor second.

Fourth, DPers are a highly productive lot. We set tough goals and we will move heaven and earth to meet them, working day and night to do so. The fall-off in productivity of American workers during the last decade is well-documented and worries all the economic pundits. But everyone knows that the output of DPers — averaged over the entire population — has rapidly grown during the same period.

Can you imagine what would happen if you set a gung ho DPer loose in the marketing organization — or in office administration or manufacturing planning or engineering design or just about anywhere in the business? I believe that this person will, figuratively speaking, "tear 'em apart" if the DPer is not literally torn apart for social indiscretions in the process.

I told all this to the boss of the new marketing vice-president, and he replied, "I transferred him in to 'tear 'em apart' and that's exactly what he's doing."

AT LARGE/Rex Malik

What Kind of DP Help For Developing Nations?

What are the computing needs of developing countries?

Why is progress so slow?

What needs to be done to help those countries?

These were the questions that Julian Bogod, president of the British Computing Society, the UK's sole organization for computer professionals, set out to answer in a recent lecture.

Bogod proposed the formation of a Council for the Application of Computer Technology for Development. The objective of this body would be to sponsor bilateral support by the UK for developing countries.

The council, he explained, would undertake the following tasks:

1. Assign British nationals to advise and assist with the establishment of government policies and plans.
2. Establish curricula, courses of instruction and examination structures.
3. Provide educational facilities in the UK for students from developing countries.
4. Plan and create technical training facilities.
5. Prepare training materials, technical manuals and teaching aids.
6. Assist in the creation of a professional structure.
7. Assist in the planning and creation of a National Computing Center.
8. Organize technical seminars and conferences.
9. Assist in the definition and implementation of strategic projects.

Bogod is sincere about this plan. This is not Perfidious Albion, looking for commercial advantage under the guise of trying to do good. It is not an attempt to turn any other country's computing into a model of the UK's, though they could pick worse.

I suspect Bogod would approve of others — perhaps the U.S., France or Japan — picking up his nine points and attempting to follow such a program.

However, since he probably shares my view about the lack of progress in Soviet computing and about the Soviets' intentions, he might be worried if the list were to include the USSR.

But if "approved" countries were to adopt similar proposals and try to go down the same route, would it do any good? Would it make any difference to peace, progress and plenty?

One school of thought says it would

(Continued on Page 40)

THE TAYLOR REPORT/Alan Taylor

'Tolas' Qualities Pose Software Challenge

Tolas is a software product that handles most accounting operations. Produced by Transcomm Data Systems, Inc. of Pittsburgh, Pa., it is powerful, but not all-encompassing. It has no fixed-asset section, for instance, and was written in Basic Plus for Digital Equipment Corp. systems only.

Yet despite these restrictions, Tolas's parameterized generative software has remarkable power to give full expression to the independent needs of accounting, production, auditing, data entry and general management staff. The package's ongoing success poses a challenge to all software I know, both packaged and in-house developed.

The Tolas challenge is simple — that other software either show it has the same or better functional strengths or else that someone adopt a new approach to building software with such strengths. To do otherwise is to keep the same rather inadequate software situation that has continued for nearly 20 years.

'Tolas' Strengths

In operation, a Tolas system consists of client-generated programs, with the Tolas generators building into the actual program whatever qualities Transcomm feels are necessary to handle the needs of a totally integrated DP operation. The client, for instance, may specify that an inventory file has to be kept and that a terminal operator should be able to add items to the inventory if and only if they have a defined security level.

The Tolas programs produced from this specification will also include the following:

- Special maintenance-file updating and Transcomm remote diagnostics.
- Special input accuracy controls that are believed to reduce operator error.
- Special file-protection controls that require double assurance of data-destructive instructions such as "Delete."
- Special hardware-error controls to permit an easy return to unbroken function after a hardware breakdown.
- Special accounting controls for automatic and potentially secure audit trails.
- Special productivity controls that permit searches for and analyses of error patterns.
- Standardized programming that allows many people to provide effective maintenance without knowing the programs at all, only the part of Tolas generally that is involved.
- Flexible operation scheduling handled by generated functional requirements given separately.

Upward Migration

Not yet demonstrably present, but certainly implicit in the structure, is the capability for Tolas customers to gain hardware independence from all or part of DEC equipment. The basic routines, written in a DEC Basic dialect, are by design very heavily parameterized and try to use only the most standard parts of the hardware. As a result, DEC delays in delivering terminals have been comparatively unimportant, and while the current environment is RSTS/Basic Plus, the programs appear to be able to operate with more advanced hardware — or even to be able to go into firmware at some stage.

More clearly developed is the capability of the programs to be kept functionally up to date, handling possible new requirements of the Securities and Exchange Commission by automatically adding new reporting structures and so forth. This would involve replacing one set of generators with an updated set and potentially either regeneration or special one-time-handling of the changeover from Transcomm.

These new and powerful capabilities of inserting accurate code to match separate customer functions bring control right back to the heights of a manual system. In such systems, the accounting, auditing and departmental structures worked under separate command, and each of the areas was able at any time to improve its own operations.

As DP came into the picture, this freedom was made subject to the prior approval of the DP department. Now it appears that this benevolent DP dictatorship may have simply been a temporary situation brought on more by an inadequate understanding of software capabilities than by any real DP limitation.

The sooner that DP adopts methods that protect the independence of all managers, the better for everyone.

With Tolas, not only can any of the traditional managers "do their own thing" safely, but provision is made for the new manager, the DPer, to join the team at team level.

Hopefully, there is more such software out there. I'd like to hear from anyone writing it, whether or not it is generative, for this is the software of the '80s.

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What DP Help Do Developing Nations Need?

(Continued from Page 37)

not, at least not in the short term. According to this view, the less developed (underdeveloped, developing or whatever you may like to call them) countries have to run in order to stand still, and there is no way they can do it.

Last year, I heard this view presented most articulately in a lecture entitled "The Future Is Further Off Than You Think." It was given by Heinz Wolff, head of bioengineering research at the Clinical Research Centre of the UK's Medical Research Council — a sort of British National Institutes of Health.

The critical passage was this:

"I believe that there is a life cycle limitation on the acceptance of technology or the acceptance of any sort of change at all. What is the evidence? The evidence can be gotton out of the developing countries.

"We have now a very considerable amount of incidence where the transition of being a village tribal chief or living in a mud hut and becoming a responsible civil servant simply cannot be made. The ethics, the motives, the way of life which would have to be encapsulated in making this transition are apparently beyond the ability of the kind of people who find themselves in this situation . . .

"I think, therefore, we have expectations from the developing countries — in terms of having stable governments, incorruptible civil services and so on — which are totally unreasonable. It took us — take the UK — probably some hundreds of years of development to get to the point we are — some 10, 20 generations. It seems totally unreasonable to expect this to happen in one generation, quite irrespective of how much education you pump into the people involved. I have no reason to believe that when you come to consider the acceptance of major technological change, this kind of thing is not going to happen as well."

Wolff was not saying that we should do nothing, but rather that we should not expect dramatic results in the short term. But if we were to adopt something like the Bogod proposals, would we be faced with an ever-open sink, a sort of black hole, for generations to come? Not necessarily so.

In any case, what is a developing country? Particularly in computing, the world does not simply break down into "us" and "them." Bogod lists four levels of computer activity, four levels of computer development within countries:

Initial level: There are no operational computers in the country. A few nationals have had contact with computing. The only sources of information are computer salesmen.

Basic level: There is some understanding of computers in government and private decision centers. A few computer installations exist, some nationals are involved and there is some training in computer technology. Computers are used in basic government operations.

Operational level: There is an extensive understanding of computers in government and private decision centers. Some very large machines are in use, training is available and some of it is excellent. Software is being designed and produced and some hardware is being manufactured. Computers affect many disciplines, particularly science, medicine and engineering.

Advanced level: Everything is well established, technologies have been changed or are in the course of being changed and new applications are regularly being developed. In other words, this category includes us.

But what does this classification mean in reality? Well, Bogod produced a table, shown here, which puts it in context.

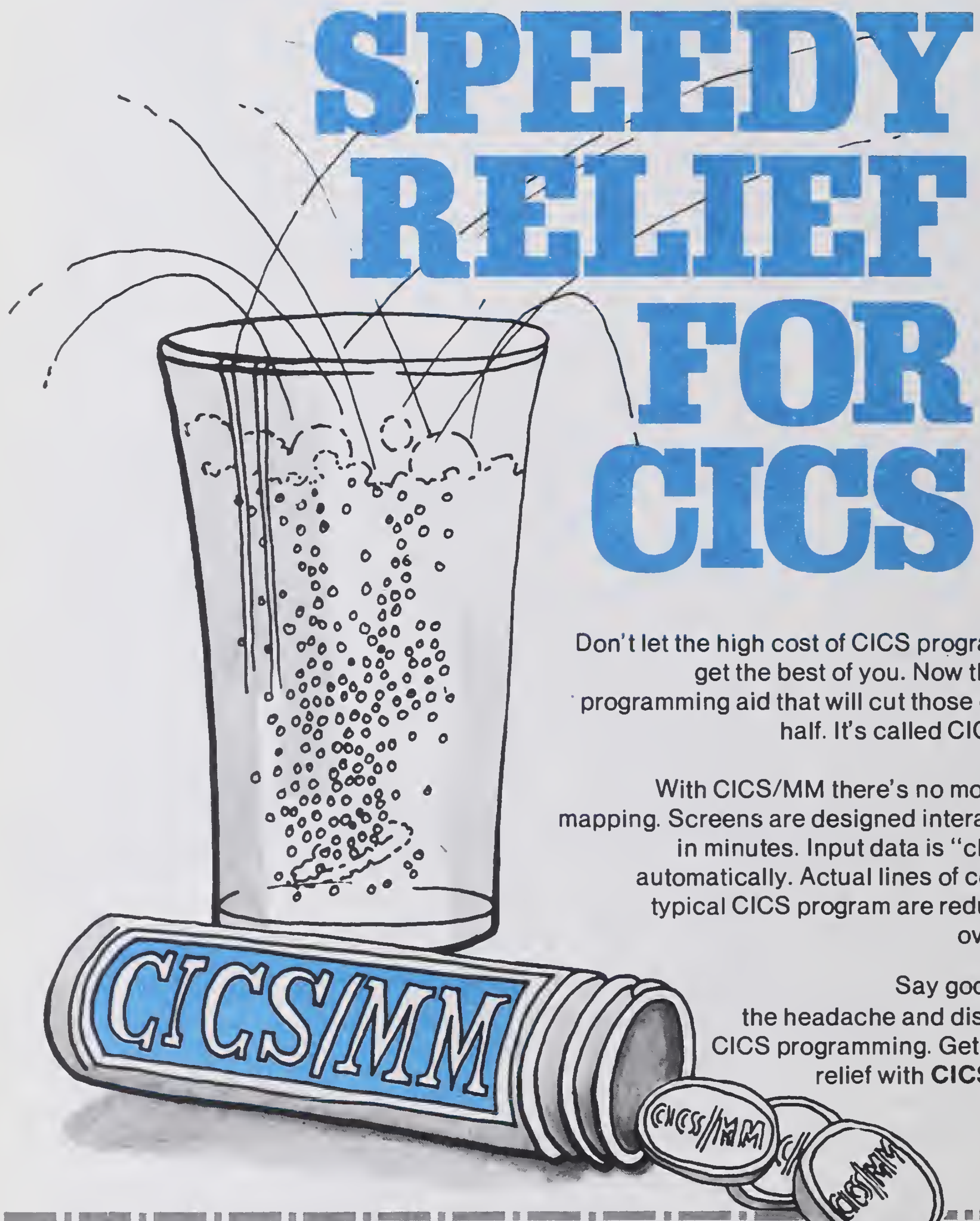
How difficult will it be to move these countries up the scale of development? In some cases, very difficult, for computing is not one of their priorities, however much those who are sold on it think it should be.

This examination of Bogod's proposals will be continued in two weeks.

	Income per capita $ (1)	*Literacy level % (2)*	*Graduates per 100,000 (3)*	*Mainframe systems (4)*
Basic state				
Chile	960	90	82	—
Indonesia	242	60	7	80
Iraq	1,280	26	79	—
Jamaica	1,310	86	28	55
Kenya	220	25	5	60
Kuwait	11,300	55	54	—
Nigeria	350	25	6	111
Pakistan	180	25	52	46
Phillipines	350	80	180	221
Saudi Arabia	4,990	15	15	—
Sri Lanka	214	84	30	13
Syria	750	40	59	—
In transit from basic to operational state				
Egypt	310	40	11	100
Malaysia	840	61	474	90
Singapore	2,470	76	96	120
South Korea	641	88	—	—
Thailand	358	82	35	115
Venezuela	2,070	82	71	1,000
Operational state				
Brazil	1,100	68	98	1,840
Hong Kong	2,090	90	35	567
India	132	36	57	448
Mexico	1,130	82	—	1,650

1. Income per Capita (1976) - The World in figures, *Economist*, 1978
2. Literacy level (1975) - *The world almanac*, US Department of Commerce, 1979
3. Graduates per 100,000 (1976) - *International Marketing, Data and Statistics*, Euromonitor Publications, 1978
4. Main Frame Systems (1978) - Local estimates

The State of Computer Development in Some Developing Countries



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LETTERS

Replacement, Evolution

"Amdahl Planner Sees IBM Replacing IMS in '80s" [CW, Feb.25] caught the reader's eye with another "scare" headline.

Only the first three paragraphs dealt with the issue and the only substance there was a "very personal opinion."

The remaining 12 paragraphs attempted to trace future trends — something we have all *experienced* over the last three decades.

The fact that our gear no longer stands on French Provincial legs has little to do with replacement vs. evolutionary software. Herbert Hellerman would have done the user community a service had this issue been dealt with up front.

Daniel F. Brooks
Palo Alto, Calif.

Deciding Factors

" 'No Thanks' Say Users of 4331s to IBM's DBMS" [CW, Feb. 18] indicated that individual users seem to refer to other users' ability to make the data base management system (DBMS) perform as the basis for their decision on whether to use the product. This characteristic, often found in many DP centers, that of relying completely on other centers' evaluation, may or may not be a legitimate process. The process of selecting a DBMS requires that one look at more than 30 different factors, each an important one that must be considered on an equal basis.

Performance, per se, is composed of not less than 10 of these individual factors. It would seem to me that the potential users of a DBMS would benefit more by evaluating their own needs in their own environment through a time-tested methodology for selection of software per se, than by relying on other users' experiences entirely. We have found that in many cases, the selection of a DBMS for one user is based on a set of criteria totally and completely different from that for another user, even though the applications might be similar.

Selecting a DBMS is not easy and should be done with a methodology that forms a total evaluation of one's needs rather than just looks at one specific area of concern.

Harvey M. Weiss
Denver, Colo

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(Continued from Page 36)

tractor studies and working papers as inputs to the OTA assessment process. We form advisory panels for the purpose of reviewing these inputs and OTA's staff work. The final OTA report is drafted by OTA staff — not by contractors — and its release is approved by the OTA congressional board before it is submitted to the requesting committee(s).

There is no precommitment on the part of OTA to use any of the future systems report or any other contractor material.

John H. Gibbons
Director
Office of Technology Assessment
Washington, D.C.

CW's Phil Hirsch responds: "OTA works very closely with its contractors, from the moment they begin a project. I know, because before joining *Computerworld*, I worked two years for OTA — as a contractor. I also know that contractors' reports — by the time they are distributed to advisory panel members for comment — do not conflict with the agency's views. Granted, the comments may lead to changes later on, but that is why the story talked about a 'draft report' rather than a 'final report.' I still believe that is an accurate description."

LETTERS

Tasteless Article

I was surprised and disappointed to see an article as tasteless and irrelevant as the "Four Nabbed in MPU-Based Child Porn Scheme" [CW, Feb. 25].

It seems to me that not every use (or misuse) of a computer is worthy of publication, particularly since the story did not convey any technique or application that would interest *Computerworld's* allegedly technical and professional audience. The author's attempt to personify the dastardly computer by writing "with the help of," as opposed to "with the use of," was pure hype. Clearly, the micro pornographers managed the data base, not the micro computer.

In addition, the use of the manufacturer's name was reckless, at best. If the intent was to give the company a free plug, I'd venture to say that it is not grateful. To be fair, the article might also have mentioned the brand name of the video tape cameras, duplicating equipment, and so forth. In fact, this information might have been more useful to those of us who know how to manage a data base, but aren't sure about photography.

I trust that CW can see fit not to resort to this type of sensationalism in the future.

Louis J. Finnegan
W. Milford, N.J.

Truth in Packaging

I looked forward to reading "System at Metropolitan Life Handles 50,000 Claims Daily" [CW, Feb. 18]. At 50,000 claims a day, we are talking about a rate of 1.7 claims a second. But in the second paragraph, the title is refuted. Instead, we read the application is running at 8,500 claims a day, *only* .29 claims a second.

What ever happened to truth in packaging?

Tim McGowan
Vienna, Va.

The headline should have read "System Will Handle 50,000 Claims Daily." Ed.

Change in Value

The Khachian Algorithm commentary of Feb. 25 was enlightening. I suggest that the "$6n^2L$ value on Page 36 should have read "$16n^2L$."

Lionel Difford
Sterling, Va.

Computerworld welcomes comments from its readers. Preference will be given to typed, double-spaced letters of 150 words or less. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

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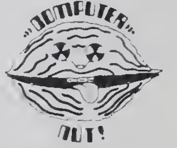

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San Mateo, March 19-21:

Day 1 Conference

D-1 8:45-9:45 EXECUTIVE BRIEFING: IBM strategies in the 1980's. John Rehfeld of IDC.

D-2 10:00-11:00 IMPROVING EDP PERSONNEL PRODUCTIVITY: Ira Gottfried, President, Gottfried Consultants, Inc. Find out how to motivate today's highly skilled — and scarce — computer system pros.

O-1 11:45-12:45 HOW WORD PROCESSING CAN BREAK THE OFFICE PAPERWORK BOTTLENECK: Charlcie Grasser, Kaiser Aluminum; Claire Smith, Syntex; Ramona Rothe, Safeway Stores, Inc.

O-2 11:45-12:45 HOW TO CUT COMMUNICATION COSTS: James Conrad, VP, Bank of America. How to use communication management tools to get more for your voice/datacom budget.

M-1 1:30-2:30 AUTOMATION FOR PLANT PRODUCTION AND TESTING APPLICATIONS: David Penning, President, DCP Associates, James Anderson, OEM Development Manager, Hewlett-Packard. Computerized production systems and their role in increasing factory productivity.

F-1 1:30-2:30 MICROGRAPHIC APPLICATIONS IN THE ELECTRONICS INDUSTRY R. L. Kauffman, Manager, Reprographic Services, General Electric.

D-3 3:30-4:30 COMPUTER GRAPHICS: NEW WAYS TO VISUALIZE COMPUTER INFORMATION FOR BUSINESS, ENGINEERING AND RESEARCH USERS Robert Conrad, Consultant, Aspen Communications. Explore the new trends in the proliferating use of graphics.

M-2 3:30-4:30 OPTIMIZE MANUFACTURING PRODUCTIVITY VIA SMALL AND LARGE COMPUTER APPLICATIONS Case histories will illustrate the most efficient uses of manufacturing resources.

Day 2 Conference

O-3 8:45-9:45 COMBINED WORD & DATA PROCESSING Sid Smith, Telecommunications Specialist, George Tamas, Consultant, Crown Zellerbach. Exploring distributed word and data processing applications in large and small companies.

D-4 10:00-11:00 DATA BASE OPPORTUNITIES IN CENTRALIZED AND DISTRIBUTED SYSTEMS Greg Leveille, President, Creative Strategies, Inc. The latest trends in mainframe and minicomputer oriented data base software.

D-5 11:45-12:45 DISTRIBUTED PROCESSING: USER UPDATE ON THIRD GENERATION EXPERIENCES How "leading edge" users in financial and manufacturing industries are integrating the latest hardware systems.

D-6 1:30-2:30 FINANCIAL & MANAGEMENT PLANNING TECHNIQUES USING EDP TOOLS Gil Swanson, Consultant, Creative Strategies, Inc. How to make cash resources more productive through software application packages and data base tools.

D-7 3:30-4:30 SMALL AND DESK TOP COMPUTERS FOR PROFESSIONAL AND BUSINESS APPLICATIONS John Craig, Publisher, *Infoworld.* How small computers can solve big managerial and technical problems.

O-4 3:30-4:30 LINKING WORD PROCESSING AND PHOTOTYPESETTING TO CUT REPROGRAPHIC COSTS.

Day 3 Conference

D-8 8:45-9:45 ENHANCING SOFTWARE/APPLICATION PRODUCTIVITY FOR END USERS Ralph Kierstead, Senior Research Engineer, SRI International. New Programming techniques including structures analysis.

O-5 10:00-11:00 HOW TO USE COMPUTERIZED TELEPHONE SYSTEMS Larry Dietz, Researcher. How to select the right PABX for current and new uses.

D-9 11:30-12:30 HOW TO COMPARE SMALL SYSTEMS FOR ON-SITE AND DISTRIBUTED APPLICATIONS. Robert Elliot, Arthur Anderson & Co.

O-6 11:30-12:30 INTEGRATED INFORMATION SYSTEMS Robert Colten, Production Systems, Tymshare. Expanding managerial productivity in the "office of tomorrow."

S-1 1:30-2:30 SMALL COMPUTERS FOR MARKETING & DISTRIBUTION APPLICATIONS Larry Dietz, Small Systems Consultant. How hardware can help get more sales marketing dollar. Ed Strobin of the Gap Stores.

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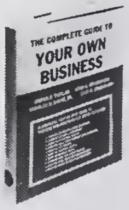

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UC088. **The Microprocessor and Its Application,**
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A collection of articles that describe and explain how to use a whole range of computer components. Three areas are covered: the properties of popular micro components and techniques for use, the management of projects involving the interworking of hardware and software, and attainment of performance by advanced microprogrammable components. $39.50

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How to design computer systems that incorporate the human factor is the subject of this new book. It explains why office or shop-floor employees should have a major design role in computer systems, especially in terms of work organization and task structures, and shows how this involvement can lead to increased efficiency and job satisfaction. The book also explains how users can be given the skills to diagnose their own problems, set efficiency and job satisfaction targets, and develop alternative forms of work organization. The gains and problems associated with the participative approach to systems design are analyzed in depth. $19.95

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For 370/138s Through 3033MPs

'Program Environment Manager' Debuts

DALLAS — A software bridge that isolates application programs from the operating and facility software on IBM 370/138 through 303MP systems is available from Hogan Associates.

Called Program Environment Manager (PEM), the package operates on IBM and compatible operating systems including OS/VS1, OS/SVS, OS/MVS and DOS/VS.

PEM reportedly establishes a logically defined environment for application programs that is said to remain static across changes in the processing environment.

PEM interfaces directly with the processing environment. Programmers, therefore, do not have to build the interface, the vendor said.

Processing Dictionary

Instructions on how to translate the logical application environment to the processing environment come from a processing dictionary in PEM.

The dictionary describes what data bases, programs and data are used. It was designed so the user need not have an extensive background in programming, the vendor claimed.

The processing dictionary also controls the processing flow for a job step or for on-line transactions. Each processing flow is a list of work units to be performed.

Getmains, data base accesses and links to application programs are defined once and may be included in any number of processing flows, Hogan said.

When PEM is used during data communication system conversions, the only major change needed is a new mapping facility, the vendor noted.

For that purpose, PEM provides a utility for extracting terminal map information from the processing dictionary and building an input data stream for the new system's map-generating facility.

Other PEM features include an integrated resource monitor, integrated trace facility, dump facility, transparent sort exit interface, exception logging and condition code setting.

The package can use any IBM or compatible teleprocessing monitor, including IMS/DC, CICS/VS, and Universal Computing Co.'s UCC/DCS. It can also operate with any IBM or compatible data base management system, including Vsam, IMS/DB and Cullinane Corp.'s IDMS, Hogan added.

PEM costs $50,000 and requires a minimum of 40K bytes of memory, the vendor said from Suite 216, 1120 Empire Central Place, Dallas, Texas 75247.

Software Outlays Ballooning

WALTHAM, Mass. — User spending for software — already outpacing the growth of total DP spending — will balloon to $8.4 billion this year, a 50% increase from $5.6 billion two years ago.

These International Data Corp. (IDC) statistics reflect a mushrooming demand for computer systems, spurred in part by the plummeting costs of hardware, the market research firm stated.

Paling in comparison to increases in software expenditures, total DP spending rose 16% from 1978 to 1979 and is expected to rise another 14% this year.

In-House Development

The fact that the growing demand for software is far outstripping the supply of programmers will boost the cost of in-house software development as user organizations are forced to pay top dollar for qualified personnel.

This trend will continue through 1980 when monies allocated to internal development will reach $6.69 billion, a 43% rise over the two-year period, IDC predicted.

As a result, users will likely depend less on internal development and instead seek outside software procurements, causing the percentage of total software dollars spent in-house to drop from 86% in 1978 to 83% this year.

IDC further predicted that, conversely, expenditures for externally developed software will nearly double over the same time frame, skyrocketing to $1.45 billion from $770 million two years ago.

Of total dollars spent on outside software, independent packaged software vendors reaped the lion's share — far surpassing the hardware vendors — and will continue to be the front runners, according to IDC forecasts.

General-purpose computer users spent about $410 million with third-party package suppliers in 1978, but IDC projects this number will rise to at least $665 million by the end of this year.

While hardware vendors accrued less than half the software revenues pulled in by the independents in 1978 — $200 million — that figure is expected to soar this year to $540 million, a 170% leap.

IDC attributes this dramatic jump to the continuing trend by hardware vendors to unbundle

(Continued on Page 46)

Updating Data Base Design — Part 2

Steps Mapped to Successful DBMS

By Robert H. Holland

Special to CW

To attain a corporate DBMS from which all future types of data bases can be derived, companies require mapping through several essential steps.

In this final installment of a two-part article, the author discusses how to make DBMS succeed. Last week's article examined why DBMS often fails and stressed the need to develop logical data designs that are independent of their physical design and implementation.

- First, organize for the data administration and data base management function.

Treating data as a primary corporate resource is necessary to achieve DBMS success.

The data administration function should take charge of developing data standards, implementing data items into a data dictionary, establishing definitions of data and, in effect, handling all the approaches and methodologies that are used for logical data base designs.

However, while data administrators should be technically

(Continued on Page 48)

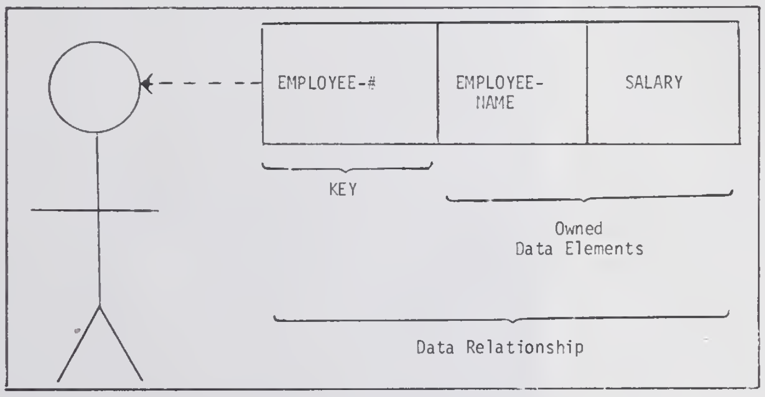

Figure 1. User View of Data

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Early Warning Option Enhanced

'Resolve-MVS' Gains Support for 3270s

SUNNYVALE, Calif. — IBM 370 and 30 series system users can monitor MVS operating system performance with dedicated 3270 terminal support for Boole & Babbage, Inc.'s Resolve-MVS.

The firm's support for monitoring software on an IBM 3270 enables users to assign local 3270 or 3270-compatible terminals to receive all Resolve-MVS information displays and automatic warning messages.

Resolve-MVS is an on-line, real-time system that provides more than 50 services to detect, diagnose and solve problems that degrade system performance. It includes graphics displays that can show overall MVS performance and is reportedly independent of a time-sharing option and its support software.

The 3270 support enables the operator to request commonly used Resolve-MVS services by hitting a program function key and to set the display screen in roll mode so several services or automatic warning messages can be displayed at once.

The user can also create Kiviat and pie graphs, according to Boole & Babbage. Resolve-MVS costs $14,000.

Option Enhanced

In addition, Boole & Babbage has enhanced its Advanced Early-Warning Services (AEWS) option to operate with dedicated 3270 terminals. AEWS displays critical messages when resource shortages or imbalances occur.

The option "enables immediate detection" of user-defined problems so that Resolve-MVS information and action services can be used to diagnose and correct them.

The AEWS system notifies the operator if, for example, any job step has exceeded a specified elapsed time. Other services monitor user-defined conditions for outstanding replies, amount of space taken by the job in real and auxiliary storage and domain overloads.

Preformatted screens improve the operator's visibility into the MVS system, according to the vendor, because warning messages appear in a reserved area of the screen and are not obscured by Resolve-MVS user-invoked displays.

The AEWS option costs $4,000, Boole & Babbage said from 510 Oakmead Parkway, Sunnyvale, Calif. 94086.

Series/1 Gets Report Writing

SAN FRANCISCO — A report writing facility for IBM's Series/1 processor is said to extract data based on CRT input of logical retrieval parameters and assemble it into formatted reports.

An on-line inquiry software, the report writer operates under the Series/1 Event Driven Executive (EDX), according to its vendor, Raymond G. Lorber, Inc.

Designed for nonprogramming personnel, the software facility reportedly lets users make requests of the data base without having to write applications programs, and select and display required information at a terminal or printer for hard-copy uses.

Query instructions can be stored in a procedure library for repeated use, a vendor spokesman said.

The system selects and processes data from disk files based on user parameters entered on a CRT, he explained. The parameters control record and data selection, sorting, spacing, formatting and totaling.

File and data definition is performed once for each data set via a dictionary, allowing the user to name data elements as needed.

Retrieval requests are prompted at a terminal and use tabular formats, said to simplify logical relations between data. Report formats can be free form, also simplifying further initial requests for information, the vendor claimed.

The system can generate volume statistics indicating the size of the requested report and offers users the option to preview reports at a terminal before printing. In addition, users can implement a partial restart at any point to eliminate a complete rerun because of incomplete request instructions.

The EDX Report Writer licenses for $7,500 from Raymond G. Lorber, Inc., Suite 2840, 333 Market St., San Francisco, Calif. 94105.

DOS/VS Terminal Printer Spooling

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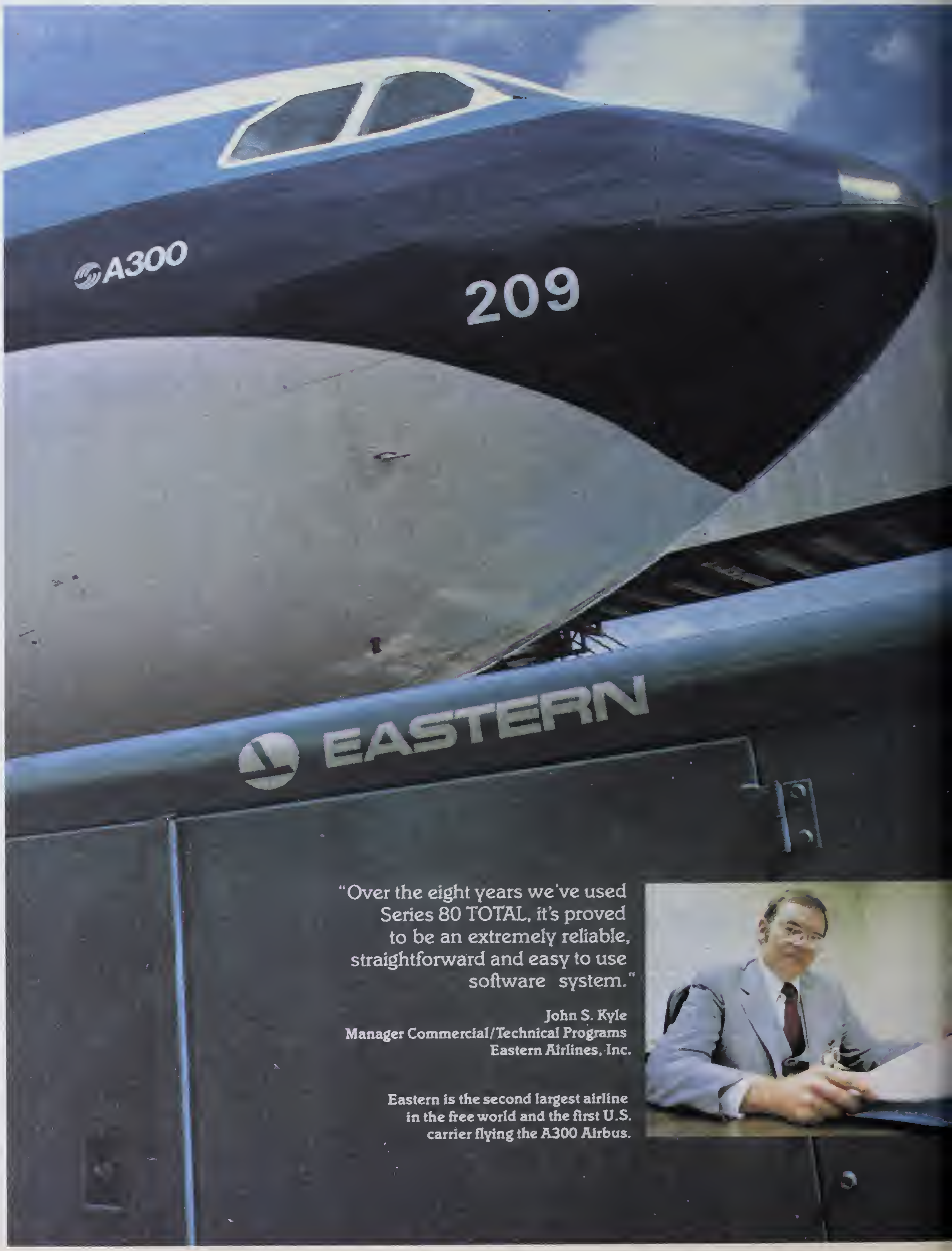

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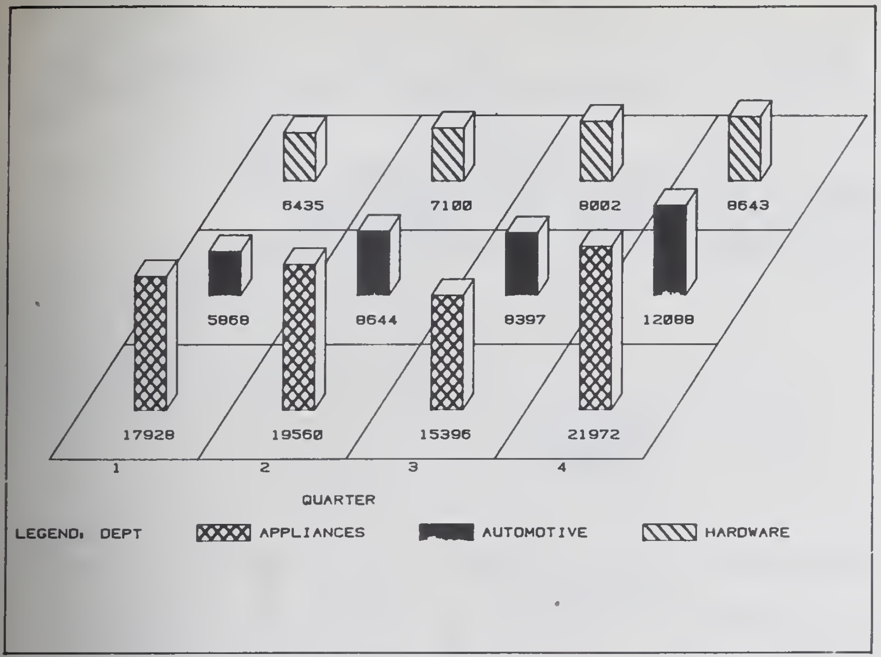

An SAS/Graph Block Chart of Sales

Color Graphics Package Aimed at 370, 4300 Users

CARY, N.C. — An interactive color graphics package for IBM 370 and 4300 systems running VM/CICS and TSO is available from SAS Institute, Inc.

Called SAS/Graph, the package runs with the SAS programming language — a combination of PL/I and Fortran. Graphics capabilities include bar, block and three-dimensional charts, the vendor said.

The package is said to cut drawing time because it doesn't require extensive code to construct graphs.

SAS/Graph will operate on the following graphics systems: Tektronix, Inc.'s 4010, 4025, 4027, 4662 and 4663; Hewlett-Packard Co.'s 2647, 2648 and 7221; and California Computer Products, Inc.'s 1012.

On IBM 370 and 4300 mainframes, the graphics software runs under OS, OS/VS and VM/CMS operating systems, the vendor added.

Shops running SAS, the vendor's data management package, can obtain SAS/Graph for $2,500 the first year and $1,000 for subsequent years. The complete SAS package, including SAS/Graph, costs $7,000 the first year and $2,500 for subsequent years, the vendor said from P.O. Box 8000, Cary, N.C. 27511.

Help Facility Added for Users Of System/2000

AUSTIN, Texas — A Help facility has been added to Intel Corp.'s System 2000/80 data base management system (DBMS) to explain command syntax, list examples of command usage and explain diagnostic or error messages.

The on-line Help data base replaces the book documentation previously referred to for operational questions, Intel said.

A Help command can also prompt the System 2000 to provide a glossary of DBMS terms via strings that are transparent to the end user.

The Help facility is available free to existing users of System 2000, which licenses for between $50,000 and $100,000 depending on the number of modules purchased.

Intel's Commercial Systems Division is located at 12675 Research Blvd., P.O. Box 9968, Austin, Texas 78766.

Accounting Package Runs on DEC Minis

ALLSTON, Mass. — A software package is available to users of Digital Equipment Corp. minicomputers to process media, production billing and job costing.

Written in Dibol, the Advertising Agency Accounting Package from Frontier Management Systems can generate formatted financial statements including balance sheet, profit and loss and supporting schedules, the vendor said.

The package costs $15,000 from the company at 214 Harvard Ave., Allston, Mass. 02134.

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Many features and facilities that have made Series 80 TOTAL a success come from the experiences of more than 2,000 users who, over the last decade, used it in almost half their applications.

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Corporate Steps Mapped for Successful DBMS

(Continued from Page 45)

competent in the area of logical data base design, they must also serve as diplomats since they represent the primary interface between user groups involved with standardizing data item definitions for the corporation.

Individuals involved in the data base management function, on the other hand, must be very familiar with the physical implementations of logical data base designs and fully understand which DBMS should be employed for particular systems implementations.

In short, data base managers should be more hardware/software-oriented than data administrators because the main function of data base managers is to translate into physical data bases the logical data base designs provided by data administrators.

User Views

After organizing data management and administration functions, a company's second step is to:

- Obtain user input for data requirements.

Experience has shown that better systems designs can be achieved through the input definition of user requirements. A dependable technique for defining user requirements is to develop user views of data.

A user view of data is defined as a perceived logical structure which relates data elements so that its user can make a decision, answer a question or acquire information education. For example, Figure 1 shows a particular, logical structure as perceived by the user.

Access to the data group in this diagram is through Employee-#. The elements of the data group are Employee-Name and Salary. The entire user view is a perceived logical structure of the data elements: Employee-#, Employee-Name and Salary.

A particular system within a company, however, may require hundreds or even thousands of user views. Both analysts and users should therefore cooperate to develop user views for the systems to be designed within corporations.

The user views collected should then be fed into a data configurator in order to validate them with a corporate dictionary and to generate an effective logical data base.

Figure 2 shows the process of entering user views which include descriptive information about the data elements, their interrelationships, the traffic or frequency of each view's occurrence and the response time required for each user view.

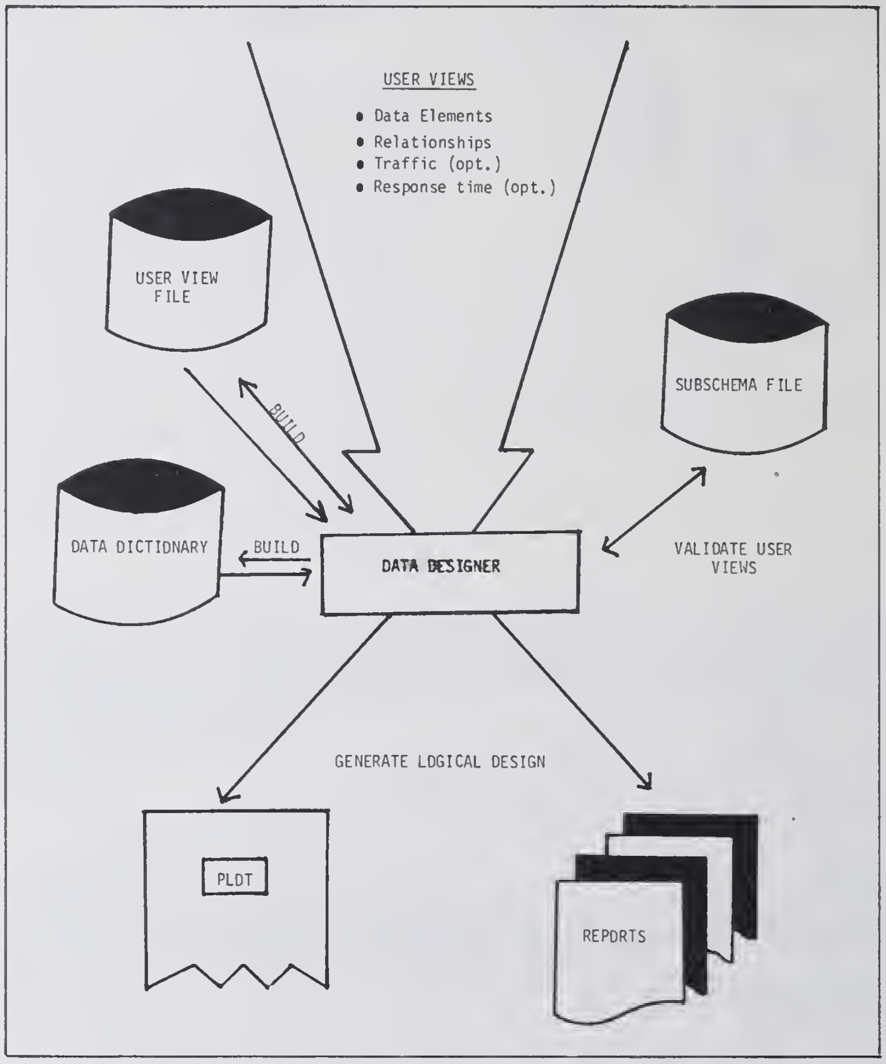

Figure 2. Process for Logical Data Base Design

Once user views have been collected, the third step is to:

- Synthesize user requirements into a normalized logical data base.

The major objective of the normalization process is to integrate multiple sets of user views into the most stable data structure form possible and in a way that maintains all the inherent properties of the data.

This means that the access path for any particular user view of data can be obtained from the completed logical data base design. This process is much too cumbersome to perform by hand and should be relegated to an automated design package as in Figure 2.

As the diagram illustrates, a data configurator must receive user views of data, validate those views against a dictionary and then perform the synthesis process which generates what is known as a third normal form logical data base.

Data bases generated in third normal form do not have to be continuously reorganized, restructured and reloaded each time new applications are added.

Throughout the logical design process, an important fourth step is to:

- Obtain user feedback.

The process of obtaining user feedback is one of the most overlooked areas in data base design because it is not only cumbersome, but also frustrating for analysts. The reason? Analysts often find themselves caught in corporate politics, corporate resistance to change and communication problems.

Ideally, though, corporations should be using an automated data design configurator to obtain normalized logical data base designs to help ease the user feedback problem. The resulting designs should be shared with end users for evaluation of the data items and their interrelationships.

When discrepancies occur in the data items or new relationships are defined, such feedback should be provided to the data configurator. In this way, the designer can easily and quickly perform multiple sets of redesigns with minimal resources.

In addition, the levels of frustration and additional resource commitments required by analysts can be reduced to a minimum.

As the process in Figure 2 shows, both logical design and data dictionary output should be shared with the users for feedback purposes to build the necessary logical data base design that will be in the most stable form possible.

Stability Analysis

This leads to step five:

- Perform stability analysis on logical data base design.

Data base designers and end users should consider the current logical data base design and determine potential access paths to the current data structure which might be required for future applications.

Such stability analysis may result in the generation of additional user views, data groups or access keys to the data base. As Figure 3 indicates, stability analysis may result in recycling to previous steps within the logical data base design process.

Following stability analysis should be the final step of:

- Implementing the data base design into a DBMS.

The third normal form data base design resulting from the previous steps may be implemented into any type of DBMS. Items such as data element keys, data groups, access paths, traffic and response time all contribute to the physical design process and resulting implementation into the DBMS.

Third normal-form logical data bases can be translated into hierarchical, network or relational DBMS. And as other types of DBMS continuously evolve in the coming years, this logical design process will serve as a corporate standard from which future data base designs may also be implemented.

Holland is president of Database Design, Inc., an Ann Arbor, Mich., consulting firm specializing in data base design software and data base management planning.

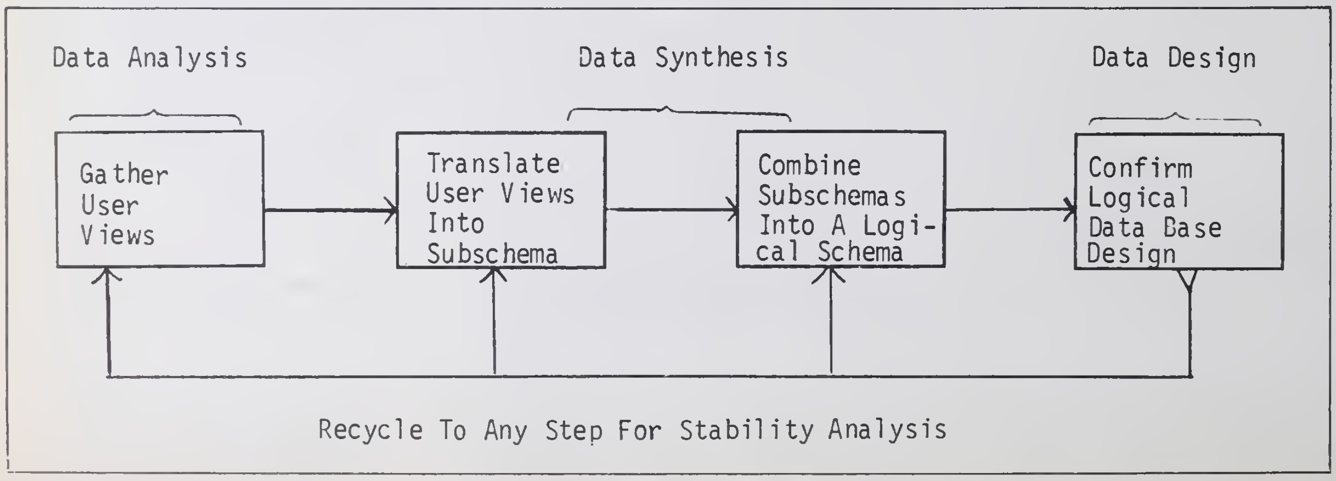
Data Analysis
Data Synthesis
Data Design
Gather User Views
Translate User Views Into Subschema
Combine Subschemas Into A Logical Schema
Confirm Logical Data Base Design
Recycle To Any Step For Stability Analysis

Figure 3. Logical Data Base Design Cycle

Software Outlays To Balloon 50%

(Continued from Page 45)

their software products.

User spending will also increase, though not as strikingly, for products and services offered by custom software vendors — defined by IDC as consulting, contract programming or other independent suppliers that do not offer off-the-shelf packages.

These expenditures rose from $930 million in 1978 to $1.1 billion last year and are expected to further increase to $1.4 billion in 1980, IDC predicted.

While in-house software development and maintenance historically accounted for and will continue to represent most of users' software dollars in the short term, the trend to purchasing externally developed packages is gaining momentum.

And IDC research indicates that once a user acquires software from an outside source, the tendency to deal with outside vendors again for future software needs strengthens.

IDC's study, "Software Spending Analysis," costs $2,500 from 214 Third Ave., Waltham, Mass. 02154.

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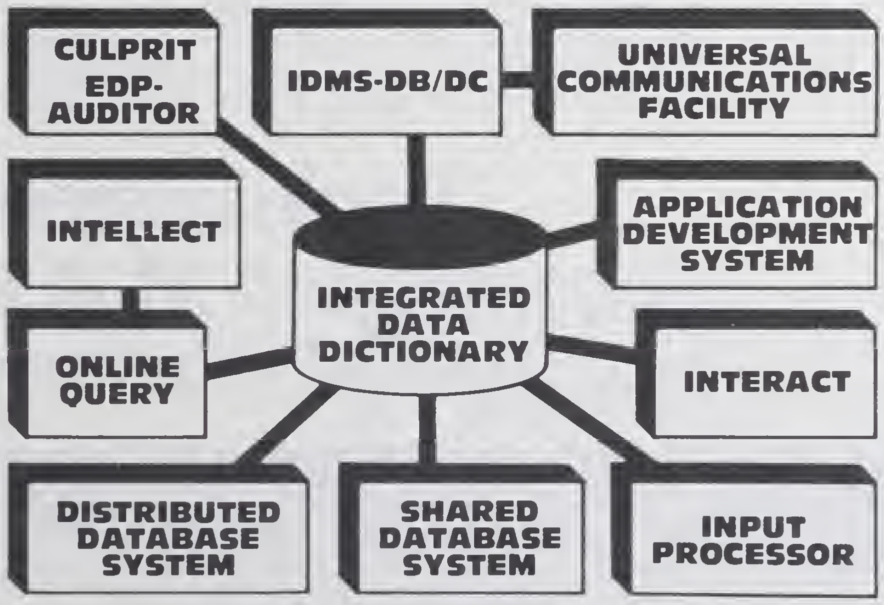
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IDMS-DC is the only data communications system designed specifically for use in the database environment. Fully integrated with IDMS, IDMS-DC therefore gives faster response time, more economical use of memory and greater simplicity of use than any other TP monitor can in a sophisticated multi-terminal configuration. IDMS-DC provides a powerful recovery facility, mapping support, storage protection and many more superior programmer productivity and data integrity features.

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IDD is the only "active" data dictionary because it is fully integrated with a database system. It is a powerful design and control tool for use with IDMS and with the other Cullinane software components, yet it can be used as a stand-alone system to define and standardize all data resources whether manual or automated, database or conventional file systems. IDD supports FORTRAN, COBOL, PL/1 and Assembler.

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CULPRIT can be used to produce even the most complex reports quickly, easily and with a bare minimum of coding. It can access virtually any file structure including conventional files or databases. CULPRIT is economical. It can produce up to 100 reports with a single pass. CULPRIT can be used as a powerful stand-alone or as part of a fully-integrated database management system from Cullinane. EDP AUDITOR combines the capabilities of CULPRIT with a special Library of Audit Routines to make it the premiere audit package available.

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This sophisticated English language inquiry system is designed for use by those in top management who have no background in computers, but have a need for timely information. Operating with a large, flexible dictionary, this new system has an outstanding ability to respond to conversational questions.

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Applications developed with IDMS/UCF will run under any TP monitor without modification—a truly major technical accomplishment. With IDMS/UCF, programmers don't even have to know the characteristics of the TP monitor they are using or may use. Applications will execute equally well through terminals connected to CICS, SHADOW II, Intercomm, Westi, Task/Master and others.

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OnLine Query. Release 2.0, is a major new advance in interactive information retrieval systems. Fully integrated with IDMS, it requires no programming in order to be immediately useful upon installation. OnLine Query provides managers and user departments with a powerful, easy-to-use set of English commands that allow instant access to selected information stored in the database.

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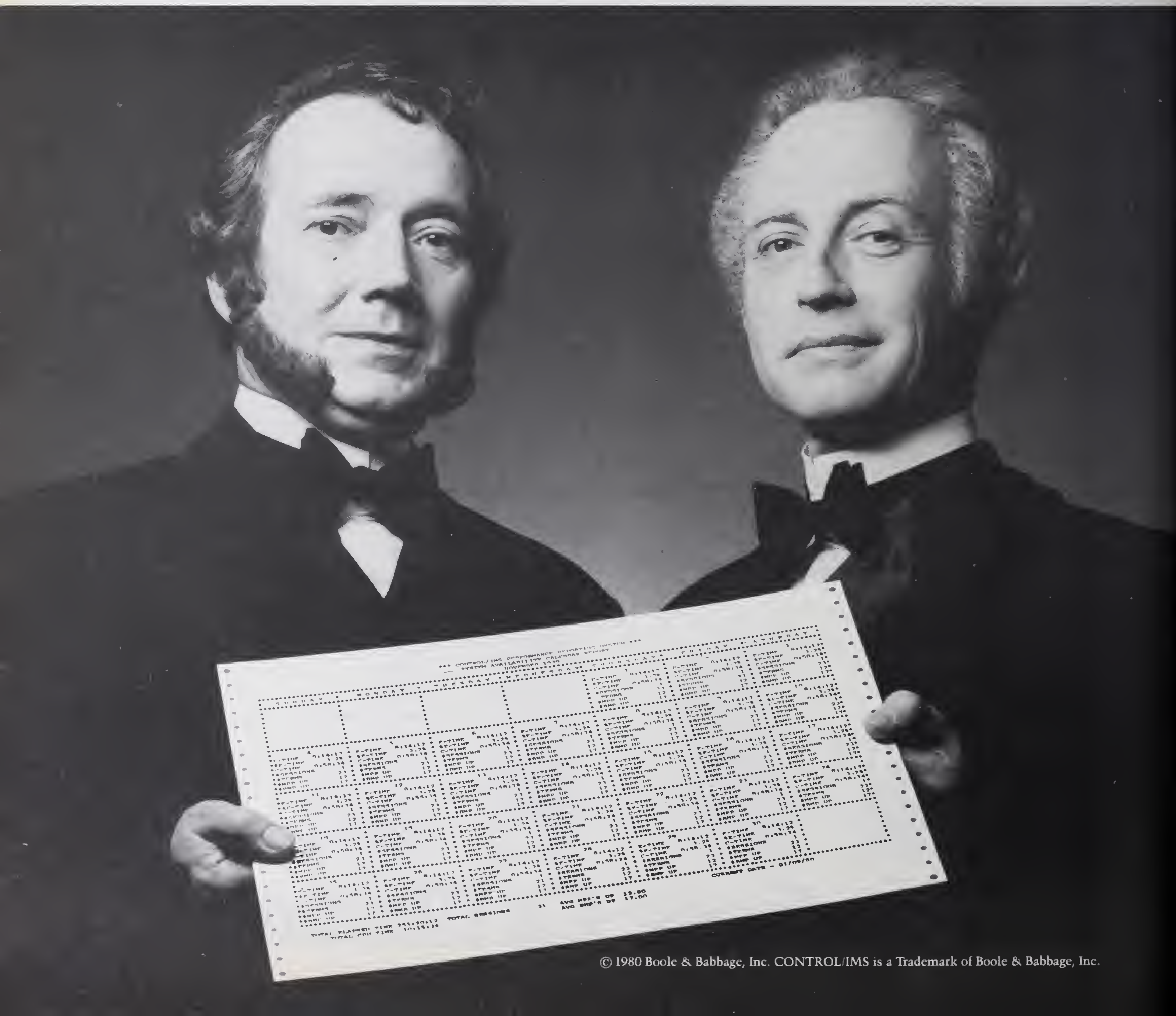

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Upgrade to MVS Integrates Non-IBM Monitor

CINCINNATI – When an insurance company's IBM DP shop upgraded from the SVS operating system to MVS, it relied on the vendor for instruction in how to tune the new system – but looked elsewhere for a software package to monitor its performance.

Why? Great American Insurance Co. needed not only to improve the MVS system's response time, throughput and availability, but also to produce performance reports that would be meaningful to management, something IBM did not offer, according to Paul Barlage, the insurance firm's director of technical support.

Barlage evaluated three MVS performance monitoring packages: IBM's Resource Measurement Facility Version 2 (RMF V2), Boole & Babbage, Inc.'s Comprehensive Management Facility (CMF) and Capex Corp.'s Plan IV.

He rejected IBM's product because it provided no reporting on disk utilization, and the reports it did produce were geared more for systems programmers than for management.

Management wanted summary reports to measure improvements resulting from the tuning effort, Barlage explained, and RMF generated too much raw data that required "time-consuming analysis" before it could be transformed into meaningful information.

Comparing Plan IV and CMF, the technical support director found the Capex package produced better management-level reports but depended on Structured Management Facilities (SMF) data in the IBM system as the basis for its reports.

CMF, by comparison, has its own data gathering programs and therefore uses less of the host system's resources, Barlage commented in explaining his firm's decision to install this package. In addition, CMF reports "summarized a great deal of analytical data in formats that were easier to communicate to management in our biweekly status meetings."

Tuning Course

To prepare for tuning the MVS system, Barlage attended IBM's MVS tuning course to learn the techniques involved and to learn where and how to look for sources of system bottlenecks.

He admitted that without the classes, "I could not have used CMF effectively, just by picking up the documentation."

Barlage also acknowledged some initial snags in implementing the software at Great American's data center, which uses two 4M-byte IBM 370/158s operating as uniprocessors in a shared Direct Access Storage Device (DASD) environment. One processor supports 32 Time Sharing Option (TSO) terminals; the other is used primarily for batch processing.

One problem noted was that some bad branches in CMF programs overlaid a portion of the operating code, which caused the CPU to go down two or three times.

Also, errors made when making up parameter cards – as CMF requires of the user – caused the system to abend, Barlage explained, adding that fixes implemented in CMF Release 1.2 alleviated these glitches.

Once up and running, however, CMF helped to improve system performance within the first two weeks, Barlage claimed.

Before the tuning effort began, the data center processed about 500 jobs daily, but with "sluggish" TSO response time and turnaround. "Our testing queues were backing up as much as 80 jobs at the end of the month," Barlage recalled.

Dwindling CPU resources also bothered the data center. "We were running at 90% to 100% of capacity with all jobs swapped in, but some were not getting through," he noted.

CMF monitoring showed that supervisor overhead took up 50% of system resources, primarily because priorities for different TSO commands were not optimally specified.

"We found that 86% of the TSO transactions were trivial – such as edits – and should have been in and out of the system immediately," Barlage observed. "Instead, they were held in the system because of contention with Actuarial Department jobs performing lengthy statistical work."

IPS Reworked

To correct these problems, IBM recommended that the data center rework its TSO Installation Performance Specifications (IPS), which are sets of control information supplied to guide the System Resource Manager in allocating MVS resources.

To tune IPS parameters, the DP staff divided TSO jobs into trivial and nontrivial performance groups running in three performance periods. Barlage

(Continued on Page 56)

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Mark Wood, Financial Representative for Houston Oil & Minerals, started as a programmer in data processing. He discussed their use of **EXECUCOM Systems Corporation's Interactive Financial Planning System (IFPS)**, over the past two years.

"The traditional approach to modeling requires long development times before results are available. Because IFPS models can be developed or altered so quickly, management has developed the confidence to ask more of the computer. We now use IFPS for all sorts of applications — from ad hoc lease sales analysis to standardized budget systems."

"I've always felt," Wood continued, *"that one of the strongest tests of the usefulness of a system is how well it can accommodate change. In the two years we've been using IFPS, we've undergone a corporate reorganization and a conversion of accounting methods. IFPS helped us keep pace with it all.*

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One of his colleagues, **David Simpson**, Houston Oil & Minerals' Manager of Planing & Administration for the Offshore Division, said *"I haven't worked with a company better than EXECUCOM when it comes to answering questions and satisfying my enhancement requests".*

"We really appreciate the support they gave us when we converted operating systems recently. We went from SVS to MVS and CMS to TSO. EXECUCOM gave us thorough backup all the way through."

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Upholstery Manufacturing System Updated

CARSON, Calif. — Northrop Data System, Inc.'s updated Standard Upholstery Manufacturing System (SUFMS II) features a range of expanded software functions and more advanced hardware technology.

Users currently operating with SUFMS I, however, must undergo conversion to update to SUFMS II, a vendor spokesman said. The software is not sold separately.

While the spokesman could not provide specific prices for such a conversion, he did say users would pay the price for the new system minus a trade-in allowance for any hardware that could still be used with the updated system.

SUFMS II reportedly offers software enhancements which include on-line credit checking, automatic style costing, comprehensive invoicing, shop floor control, gross profit analysis and standard financial functions such as general ledger.

A materials requirements planning module allows time-phasing of inventory to reduce inventory levels, increase turns and reduce dead stock or parts shortages, the vendor said.

In addition, SUFMS II features Northrop's Superbill which, by entering style options, permits automatic modifications of the standard bill of materials.

Besides increased software functionality, the Microdata Corp.-based system, running under the Reality operating system, contains hardware updates.

SUFMS II provides for expanded main memory up to 512K bytes and uses Winchester disk technology.

The minimum hardware configuration needed to support the updated software includes the CPU with 64K bytes of main memory, a CRT, a disk drive with 20M bytes of storage, a 150 line/min line printer and a 1,600 bit/in. tape drive and a modem.

Users can add more hardware features without any additional software conversion, a spokesman claimed.

The minimum configuration costs $75,000 including hardware, software, system installation and user training. The vendor is at 1160 Sandhill Ave., Carson, Calif. 90746.

MVS Upgrade Includes Monitor

(Continued from Page 51)

used CMF's System Workload Report to determine how each change in job priority affected system performance by monitoring CPU, real memory and I/O utilization for each performance group.

Trivial transactions were routed to the highest priority performance period where they received sufficient CPU cycles to complete in 1 sec or less, compared to a previous average response time of 3 to 5 sec.

What resulted — in addition to improved response time — were increased throughput and productivity. According to Barlage, the average wait time at the terminal dropped from 23 sec to 17 sec and the number of jobs completed each day rose from 250 to 375.

After reworking IPS parameters for the normal TSO environment, similar procedures were implemented for four others: TSO during month's end, normal batch production, month-end production and night and TSO batch production.

As a result, queue backlogs at the end of the month dropped from 80 jobs to seven and overall daily throughput rose from 475 jobs to 700, Barlage said.

Besides tuning IPS parameters, the data center chopped supervisor overhead more significantly by minimizing disk head movement to improve I/O performance.

Using Boole & Babbage's Data Set Optimizer (DSO) for this task, the DP center reduced head movement an average of 20% to 30%, Barlage claimed.

DSO also revealed a shared DASD conflict, justifying a $10,000 outlay for a corrective software package — the Multiple Systems Integrity facility from Allen Services Corp.

With the initial tuning effort complete, Great American integrated CMF into regular operations and runs the package two hours daily.

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'A Higher Level of Encryption'

Siemens Adds Tools Not Based on DES

ISELIN, N.J. — A line of cryptographic devices claimed to employ "a higher level of encryption" than is possible with the federal Data Encryption Standard (DES) is available from Siemens Corp.'s Data Communications Division.

Most commercially oriented encryption devices comply with the DES, which has been the standard for civilian DP facilities in the federal government since the IBM-developed algorithm was adopted by the National Bureau of Standards in 1977.

"Under ordinary commercial conditions, the DES system is more than adequate," a Siemens spokesman said, "but in many of today's business situations, oil companies, banks, brokerage houses, commodities traders, etc. need maximum security in the transmission of information."

A user study by Siemens found that "present international economic, commercial and political conditions have helped to create a market for a type of cryptography equipment that was once almost wholly confined to governmental, military and diplomatic services."

Those conditions include increased secrecy in petroleum, natural gas and mineral exploration, the spokesman noted. Other circumstances that have increased the demand for better encryption methods are intensified dealings in international currencies and precious metals and stepped-up competition among multinational corporations.

Rejecting the DES, Siemens turned to Hagelin-Crypto AG of Zug, Switzerland, for an algorithm to support its Cryptomatic HC-5020 hand-held ciphering machine and Cryptomatic HC-5050 teleprinter ciphering machine.

The HC-5020 is powered by a nickel-cadmium battery and runs off-line from the host CPU. Equipped with an electronic liquid crystal display and alphanumeric keyboard, this portable device has a built-in text memory,

(Continued on Page 61)

Package Ties IBM 5260s, CPUs

NEW YORK — A point-of-sale (POS) data communications software system for use between IBM's 5260 Retail System and most presently installed or ordered IBM mainframes is available from Computer Dynamics, Inc.

The 5260 consists of IBM's 5265 Shared Media Terminal and a connected cluster of up to 10 IBM 5266 satellite terminals, a Computer Dynamics spokesman explained. The 5265 contains a diskette to hold data received from the outlying 5266s in addition to POS data entered at the 5265.

The Advanced POS Communications System from Computer Dynamics can both send to and receive from the 5265's diskette. This reportedly eliminates the need for multiple phone lines and modems to support each POS terminal.

With the POS software, data transmitted to the host 360, 370, 30 series or 4300 series mainframe consists of POS data entered at the terminals during the day, the spokesman noted. The retailer can receive data such as price lookups or negative credit files at the 5260.

Specifically, the Advanced POS Communications System is a multiline Batch Telecommunications Access method (Btam) program that will run under IBM's DOS, DOS/VS, DOS/VSE, OS, OS/VS1 and OS/VS2 operating systems. The fact that the software supports multiline communications is important, Computer Dynamics asserted, because it allows the host CPU to communicate with multiple 5260 systems concurrently.

That permits the transmission of large amounts of data to the central DP facility without consuming large amounts of computer time, the spokesman claimed. Merchandise Control and other IBM reporting subsystems can then be processed promptly, he added.

(Continued on Page 61)

Bell-Type Modem Costs $200

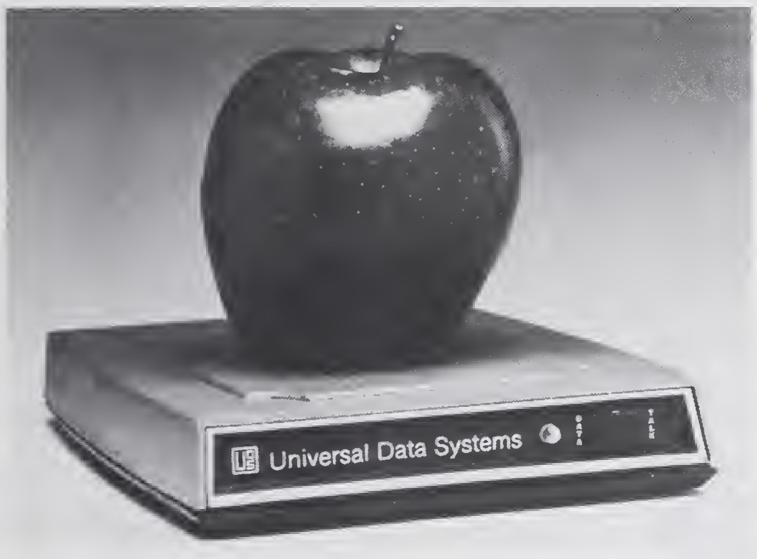
HUNTSVILLE, Ala. — What some users need is a good $200 modem.

Universal Data Systems claims to have such an offering to allow full-duplex data communications over ordinary two-wire telephone circuits at speeds up to 300 bit/sec.

The Model 103 LP modem is compatible with Bell's 103 data set and is being touted as a logical replacement for the acoustic couplers now employed with smaller computer systems. The 103 LP derives all its operating power directly from the telephone line rather than an ac electric system, a spokesman said.

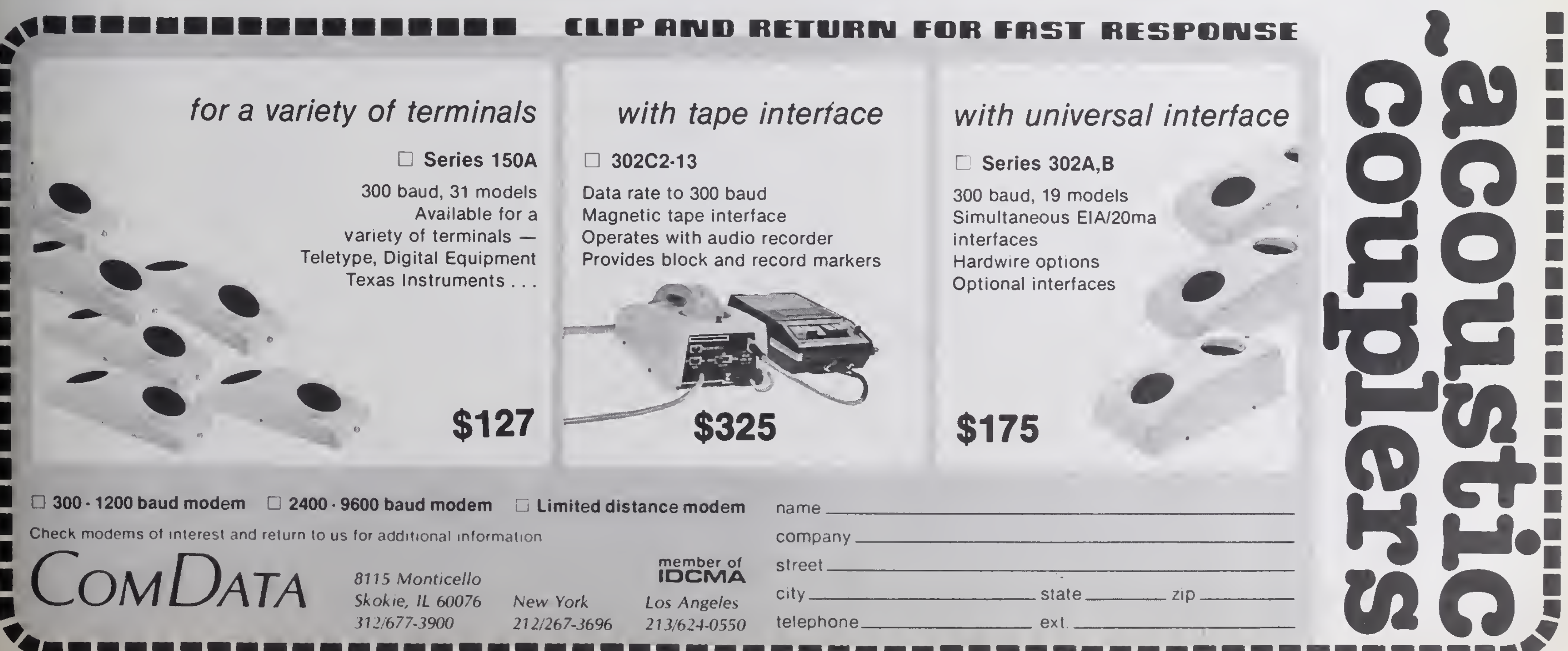
Moreover, the modem contains connectors for both RS-232C and teletypewriter interfaces and snaps into an ordinary telephone in seconds, he claimed.

An ordinary "Talk/Data" switch on the 103 LP's faceplate enables the user to return his telephone to the ordinary voice communications mode without disturbing cable connections, he added.



The Model 103 LP modem is less than 1.25 in. thick and configured to fit underneath an ordinary telephone handset; no additional desk or counter space is required for installation. The originate-only modem features phase coherent, frequency shift key modulation.

Universal Data Systems is at 5000 Bradford Drive, Huntsville, Ala. 35805.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What's the Difference?

By Brad Schultz
CW Staff

How are the Hagelin-Crypto devices introduced by Siemens Corp. more powerful than products based on the federal Data Encryption Standard (DES)?

If the Swiss-developed units really are more effective as a means of data security, that may be because of better schemes for management of the encryption key — the bit string that identifies the precise operation necessary for rendering enciphered text intelligible.

However, the number of distinct key possibilities for the Siemens products is less than the roughly 10^{17} variations possible with DES-compliant hardware. The number of key possibilities is usually considered a measure of an encryption device's ability to withstand the most simple-minded but most expensive approach to computer-supported attacks.

This approach, commonly called the "brute force attack," requires the aspiring transmission eavesdropper to try out every key possibility until he hits on the key actually needed for decipherment. The vast ranges of key possibilities for contemporary encryption systems makes brute force attacks impractical unless the attacker has access to a powerful computer system.

Because DES gear relies on a 56-bit encryption key, the range of key possibilities is 2^{56} (otherwise expressible as about 10^{17} or as roughly 72 quadrillion).

Many of those who contend that the DES algorithm can be broken cost-effectively by special-purpose processors made from present or near-future technology often base their criticism on the assertion that 56 bits are too few for a strong encryption key.

According to Siemens, the HC-5020 and HC-5050 automatically generate keys from a range of 1.4×10^{14} distinct possibilities — about a thousand fewer variations than DES gear is said to deliver.

Siemens Adds Cipher Tools

(Continued from Page 57)

which Siemens claimed is a first for electronic portable machines of this type.

The memory eliminates the need for tedious and time-consuming character-by-character operation, the spokesman observed.

With the HC-5020, the user can enter complete messages for ciphering and deciphering and for subsequent continuous readout from the display of the ciphered text and the deciphered plaintext.

The Cryptomatic HC-5050 teleprinter ciphering machine incorporates a Siemens T-1000 all-electronic teleprinter, which runs at 100 bit/sec, an all-electronic Hagelin-Crypto cipher unit.

This teleprinting cryptographer was designed to function in "local" mode as an off-line terminal or for direct on-line transmission of ciphered messages, which can be stored in its digital memory.

The HC-5020 and HC-5050 cost $3,790 and $11,320, respectively. Siemens Corp. is located at 186 Wood Ave., S. Iselin, N.J. 08830.

Software Ties IBM 5260s

(Continued from Page 57)

The POS software requires the use of a communications controller at the host, which can be an IBM 2700 or 3700 series unit. The Computer Dynamics package reportedly supports transmissions to the 5260 at rates up to 2,400 bit/sec.

Moreover, the 5260 can run in unattended mode; at the conclusion of transmission, the POS software automatically powers down the IBM system, according to the spokesman.

The Advanced POS Communications System costs $8,000. Computer Dynamics is located at 10 E. 39 St., New York, N.Y. 10016.

CRT Analyzer Tests Units in the Field

CHICAGO — A CRT restorer/analyzer is available that permits field testing of data terminal screens, both monochrome and color.

The $360 Model 467 from B&K Precision at 6460 W. Cortland St., Chicago, Ill. 60635, is said to provide direct information about tube conditions.

It allows all three guns of a color CRT to be tested simultaneously, the vendor said.

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DEC Enhances Terminal-Based Factory Systems

MAYNARD, Mass. — Data communications users that apply networks of Ascii terminals to support factory management operations have gained enhanced versions of Digital Equipment Corp.'s Distributed Plant Management (DPM) systems.

Those systems are based on DEC's PDP-11/44 mid-range minicomputer. DPM users link remote Ascii terminals, including "semiintelligent" and fully programmable units, via a multidrop communications line called the Decdataway, a DEC spokesman explained.

The systems drive industrial data collection, factory data management and process control applications.

The recent enhancements consist of several software development kits to support the RSX-11M and RSX-11M-Plus operating systems, which control the integral PDP-11/44.

A software module called DPM-Plus, designed for RSX-11M-Plus-based host systems controlling large terminal-based networks, provides a transparent user interface for standard Ascii terminals, such as DEC's VT110, connected to the Decdataway.

DPM allows checkpointing of user tasks during interrupts to speed throughput and swapping of tasks to disk when terminals are inactive. Remote terminal users can access the Datatrieve data inquiry and reporting system residing at the host.

Subsystem Support

DPM software has been enhanced to provide additional support for DPM50 intelligent remote subsystems. It is known as Version 4 and supports down-line loading of system and diagnostic software for remote subsystems, as well as task-to-task communications in Fortran or macro assembly language.

The DPM and DPM/Plus systems are configured by adding two Decdataway controllers, connectors and test cable, the DPM or DPM/Plus software and diagnostics and documentation.

DPM kits cost $15,000 with full support and either 800- or 1,600 bit/in. tape or RL02 disk as the distribution medium. DPM/Plus kits, with software contained on 1,600 bit/in. tape, cost $16,500.

Delivery is scheduled for July, 1980, DEC said from 146 Main St., Maynard, Mass. 01754.

Communications To Be Subject Of Seminar

MADISON, N.J. — A short course on data communications systems will be offered in six U.S. cities this spring.

The three-day seminar from the American Institute for Professional Education (AIPE) is intended for "data processing users and designers who desire to master the rapidly expanding field of data communications."

Personnel who are just getting started in the field or who could use an update on recent developments are the primary audience, a spokesman added.

According to AIPE's course outline, topics to be covered include basic elements of a data communications system, types of transactions, satellite considerations, communications media, carriers and regulation, network services, data validity checking, line protocols and terminals.

The seminar will be held in Seattle on April 9-11, San Diego on April 16-18, San Francisco on April 23-25, Greensboro, N.C., on April 30-May 2, Boston on May 5-7 and Washington, D.C., on May 14-16.

Registration costs $545, including text materials. However, three or more registrations made at the same time from the same firm are entitled to a 10% discount.

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Terminal Scans Bar Code

WESTWOOD, Mass. — Bar code data collection can now be accomplished with a portable data entry terminal offered by Computer Identics Corp. for manufacturing, distribution and retail applications.

The Portable Code Processor (PCP) II handles such applications as inventory, order picking, order selection/verification, receipts processing and other data collection functions.

Data can be transferred to a host CPU in an asynchronous serial Ascii format at speeds of 300-, 1,200- and 4,800 bit/sec via a 20 mA current-loop communications link, according to Computer Identics.

The terminal costs approximately $1,600, a spokesman said from 31 Dartmouth St., Westwood, Mass. 02090.

Modem, Coupler Debut

NEW BRIGHTON, Minn. — The FM327 300 bit/sec modem from Multi-Tech Systems, Inc. provides automatic answering capability and is compatible with Bell's 103 and 113 sets, directly replacing the 113B and 113D.

Featuring crystal controlled circuits and 11 status indicators, the FM327 is registered with the Federal Communications Commission (FCC) and comes in both stand-alone and rack-mounted versions.

A stand-alone FM327 costs $365, while 16 rack-mount FM327s can be purchased for $230 per card.

The MT1001D data coupler from Multi-Tech is a directly connectable replacement for Bell's CBT 1001D or B Data Access Arrangement (DAA).

The MT1001D is also registered with the FCC.

The coupler costs $125. Mutli-Tech's address is 82 Second Ave., S.E., New Brighton, Minn. 55112.

Xerox CRT Uses Ascii

LOS ANGELES — Xerox Corp. has introduced a full-page keyboard CRT terminal for users of its nationwide data communications network or to function as a stand-alone peripheral.

The Model 1330 has a standard keyboard, a 10-key numeric pad and uses the Ascii communications protocol, a spokesman said.

It may be purchased for $1,500 or leased for $97/mo, including some maintenance. Optional maintenance on purchased terminals costs $25/mo.

Xerox's Computer Services Division is located at 701 S. Aviation Blvd., El Segundo, Calif. 90245.

POS Systems To Be Topic Of Seminars

NEW YORK — Point-of-sale (POS) systems will be the subject of two National Retail Merchants Association (NRMA) seminars planned for Chicago and Los Angeles next month.

Coordinated by Errol Cook, a partner at Arthur Young & Co., The seminar will feature discussions by Tex Givan, national operations manager for Sears Roebuck & Co., and R. Vincent Conant, vice-president and corporate information systems director for Carter Hawley Hale Stores, Inc.

The seminar is scheduled for April 14-15 in Chicago at the Hyatt Regency O'Hare Hotel and for April 22-23 at the Los Angeles Hilton Hotel. Registration costs $195 for NRMA delegates and $275 for others.

More information is available from NRMA at 100 W. 31 St., New York, N.Y. 10001.

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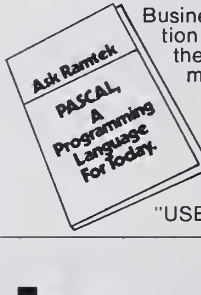
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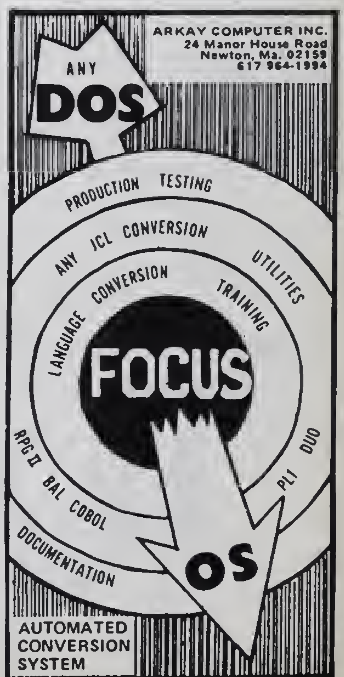

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AUTOMATED CONVERSION SYSTEM

'Jaims' and 'Joei' Help GAP Bridge Inventory Shortages

By a CW Staff Writer

DALLAS — A major automotive parts distributor here serving 850 stores is using an on-line terminal network to restock member stores.

General Automotive Parts (GAP) is using three types of terminals connected to a pair of IBM 360/65s (one is redundant), each with 756K bytes of memory. The terminals are located at the Napa automotive parts and supplies stores and at 15 distribution outlets in a 12-state area surrounding Dallas.

In addition to on-line parts inquiry and orders, each of the stores enters its daily business records on a terminal, where they are stored until the terminal is automatically polled through a Memorex Corp. 1270 line controller located in GAP's Dallas headquarters.

The terminal sends the information to the mainframes, which then generate stock orders at the 15 distribution outlets before the start of the next day's business. It is usually possible to get an order to a store within a day of its placement, especially if it is needed in a hurry, according to Ron Lyons, coordinator of GAP's Jobber Automatic Inventory Management System (Jaims).

Mixed Equipment

The network was put in place nearly 10 years ago, replacing a manual system. The equipment used (and only now being phased out) was MSI Data Corp.'s Model 2002 keyboard entry system and cassette recorder, connected to an auto-answer modem and strip printer at each store and distributor.

A few years ago, two distribution outlets took delivery of Lear Siegler, Inc. CRTs and Techtran Industries, Inc. keyboard terminals, but this equipment was not suited to the application and is being phased out as well.

It will be replaced by Texas Instruments, Inc. TI 765 printer terminals.

According to Don Hauk, director of DP for subsidiaries, the terminal can be used to indicate the location of a stock part, cost per unit and any part number revisions. A salesperson can then order the part and enclose shipping instructions by typing them on the Model 765 keyboard and getting an immediate confirmation through the mainframe.

The terminals are programmed for Job Order Entry and Inquiry (JOEI) — to determine the availability of an auto part — and the Jaims inventory system, which is used to obtain a part within a day of an order or to ensure that commonly needed parts are in stock.

Information about the status of parts on order is relayed to a store with the name of the distribution outlet that can supply it, the part reference number and the date and time of a particular transaction, all of which is printed at 30 char./sec on the TI's built-in thermal printer.

"The 765 terminals are very important to the Joei system," Hauk said. "It is the store owner's primary tool for placing special orders with the distribution center, and it allows customers to be serviced more efficiently."

The terminal network is a time-saver, according to Cyrus Miller, owner of Cy's Auto Parts in Houston: "With my terminal, I have the answers I need within several seconds." The terminal saves the cost of a full-time employee, he added.

Bubble Memory

Besides placing orders and checking the shipment progress of ordered parts, GAP also uses the TI terminals to provide inventory control and accounts receivable. According to predetermined guidelines set by the store owners, Jaims orders for owners when stock gets low. And because the terminal's built-in bubble memory retains past and present inventory information, a store owner knows the data is safely stored.

These capabilities are important to people like Wander Baker at Renssealer Auto Parts in Renssealer, Ind. "We must use our 765 six days a week, and it has really saved us money. With TI's bubble memory storage, the terminal can collect and store all of our sales for the day and will retain it even when the power is shut off," she said.

The nonvolatile bubble memory was an important consideration in GAP's selection of the TI 765, along with the terminal's one-piece design and portability.

GAP pays only for the time it takes to transmit data using the terminal's acoustic coupler. "That's a lot less costly than verbally relaying the information over the phone," which GAP did before installing its terminal network, Hauk said.

GAP has a full-time coordinator in each of its 15 distribution outlets to train store owners and employees to use the network, although Hauk said the terminals are not difficult to learn.

Patents Granted For Bus Systems

BEDFORD, Mass. — The U.S. Patent Office has awarded the Mitre Corp. here two patents in the area of digital bus communications systems. Both patented systems operate in the time-division, multiple-access mode and include a number of terminals coupled to a common signal path.

The first system uses a "slotted" digital communications bus in which time slots are allocated to various requesting terminals to establish communications links over the bus. One version of this system has been built for communications at 7.4M bit/sec and can handle hundreds of connected subscriber devices such as CRT terminals, printers and host processors, a Mitre spokesman said.

The second system uses an "unslotted" digital communications bus in which each subscriber contends for service on the common channel, using a carrier-sense multiple-access technique. Two versions — one operating at 307.2K bit/sec and the other at 1M bit/sec — have been built.

The second system is also reportedly able to handle hundreds of connected subscriber devices.

Both systems were designed to coexist on a community antenna TV cable network and to use only a small portion of the available electromagnetic spectrum, the spokesman noted.

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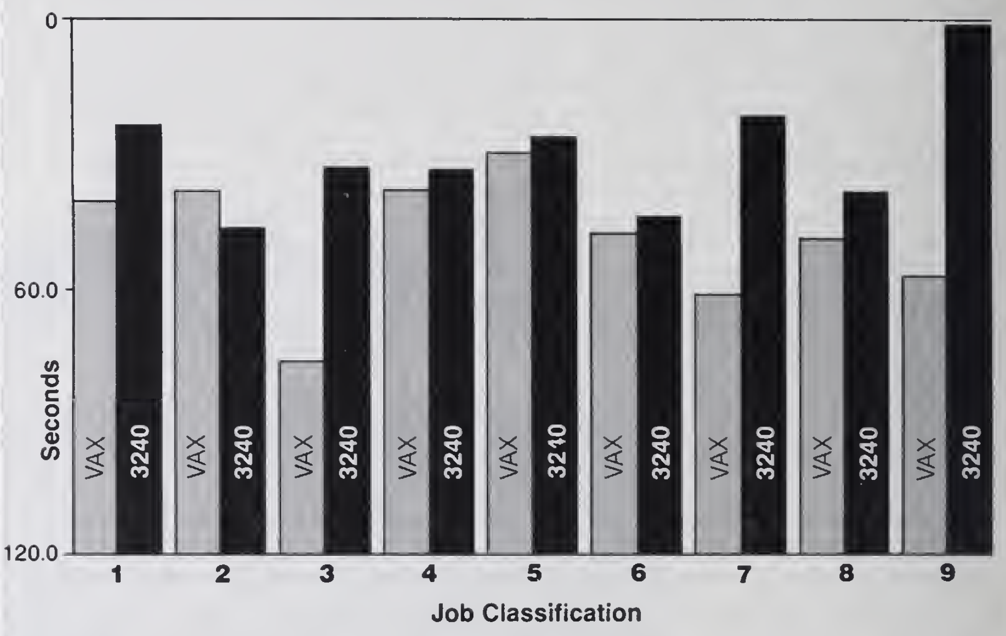
The benchmarks prove it...

1. Performance Measurements

Benchmark Name	VAX 11/780 CPU time	Perkin-Elmer 3240 CPU time	Performance Ratio*
PMS0154	1.140	0.907	1.26
PMS0254	4.710	4.485	1.05
PMS0354	9.160	8.990	1.02
PMS0454	43.610	43.451	1.00
PMS0554	86.420	86.123	1.00
PMS0664	1.610	1.350	1.19
PMS0764	7.040	6.679	1.05
PMS0864	13.730	13.370	1.03
PMS0964	66.830	66.068	1.01
PMS1064	132.920	129.727	1.02
PMS1124	1.520	1.306	1.16
PMS1234	2.470	2.424	1.02
PMS1324	1.310	1.618	0.81
PMS1407	251.560	37.327	6.74
PMS1507	50.260	57.657	0.87
PMS1674	22.440	23.005	0.98
PMS1724	52.550	53.133	0.99
PMS1807	50.180	34.766	1.44
PMS1907	32.020	34.679	0.92
PMS2007	17.720	20.264	0.87
PMS2107	13.450	20.242	0.66
PMS2202	33.311	26.352	1.26
PMS2324	121.610	137.997	0.88
PMS2402	0.940	0.539	1.74
PMS2502	0.720	0.562	1.28
PMS2624	122.920	227.689	0.54
PMS2708	4.850	0.961	5.05
PMS2809	103.770	0.006	17295.00
PMS2934	0.660	0.414	1.59
PMS3009	0.230	0.006	38.33
PMS3103	0.610	0.398	1.53
PMS3202	4.740	3.923	1.21
PMS3307	2.470	1.959	1.26
PMS3407	39.190	7.774	5.04
PMS3507	5.580	2.587	2.16
PMS3607	156.540	20.077	7.80
PMS3701	4.480	1.621	2.76
PMS3802	4.060	2.874	1.41
PMS3903	6.050	3.864	1.57
PMS4002	9.330	5.505	1.69
PMS4102	76.290	77.764	0.98
PMS4202	118.490	125.039	0.95
PMS4301	110.650	75.569	1.46
PMS4403	1.990	0.739	2.69
PMS4584	219.990	189.081	1.16
PMS4603	18.640	16.939	1.10
PMS4701	0.350	0.077	4.55
PMS4802	0.830	0.880	0.94
PMS4934	0.340	0.050	6.80
PMS5008	0.430	0.168	2.56
PMS5108	98.950	55.419	1.79
PMS5208	0.900	0.917	0.98
PMS5308	0.330	0.029	11.38
PMS5408	2.080	1.697	1.23
PMS5502	1.130	2.180	0.52
PMS5602	207.140	198.685	1.04
PMS5703	585.170	254.545	2.30
PMS5824	18.740	18.194	1.03

*Performance Ratio = $\frac{\text{VAX 11/780 CPU time}}{\text{Perkin-Elmer 3240 CPU time}}$

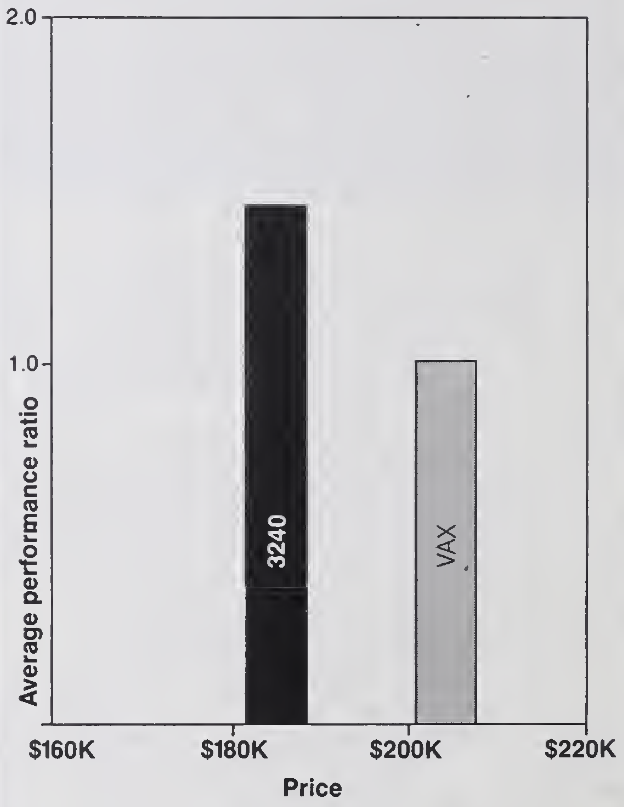
2. Perkin-Elmer 3240 vs. VAX* Average Time by Job Classification



1. Integer
2. Single-precision
3. Double-precision
4. Math functions
5. Single-precision whetstone timings
6. Double-precision whetstone timings
7. Arrays
8. Job mix
9. Compiler technology

*VAX is a trademark of Digital Equipment Corporation.

3. Proven Price/Performance



The configurations tested were 2 MB of memory, 67 MB disc, 75 ips tape, Floating Point Processor, CRT terminal, battery backup, and system software. The 3240 had a Writeable Control Store and Fortran Enhancement Package, while the VAX 11/780 had a Floating Point Accelerator.

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In Table 2, we organized the benchmark results into nine common types of job classification, so you can see at a glance how the 3240 stacks up vs. VAX 11/780. (The ninth classification demonstrates the superiority of Perkin-Elmer's system software, in this case globally optimizing FORTRAN VII.)

As shown in Table 3, the story is simple and uncomplicated. The Perkin-Elmer 3240 outperforms VAX 11/780. And it costs less.

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IDS Switch Allows Monitoring Between Sites

LINCOLN, R.I. — Data monitoring between remote sites can reportedly be accomplished with International Data Sciences, Inc.'s (IDS) Model 570, a bridging switch installed on-line between two modem repeaters at their digital interfaces.

The Model 570 allows on-line monitoring of data and timing in both directions and is capable of operating with modems with RS-232C, Current 303 and CCITT V.35 interfaces. The bridging switch can be used for on-line traffic monitoring and includes LEDs to monitor EIA signals at the interfaces, according to IDS.

Users can internally time modems or use timing supplied by the Model 570 — either at 50 KHz or 56 KHz — by selecting speeds on a front-panel switch. The Model 570 costs $3,080.

IDS has also introduced the Model 6101 sharing unit, which allows up to four modems or data terminals to share a common device in a polling network. Further, the firm introduced a desktop version of its 8540 phone line crossover switch, called the 8540-D.

The Model 6101 operates at data rates up to 19.2K bit/sec in both synchronous and asynchronous modes. Each channel incorporates an anti-streaming timer that prevents a distributed device from occupying excessive channel time, IDS said.

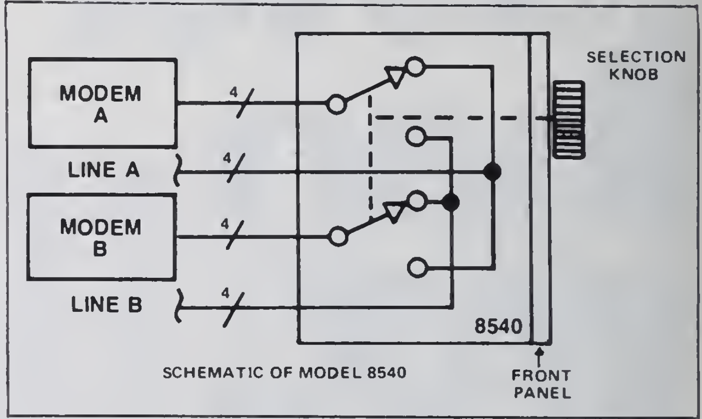
The timer can select 30 sec or 5 min connection durations or be disabled if it is not needed, a spokesman noted.

Modems and data terminals can be placed up to 50 ft from the 6101, allowing a maximum of 100 ft of separation between common and distributed devices. They can be separated up to 500 ft with an optional IDS low-capacitance cable.

The 6101 allows the user to simplify or expand a data communications system by decreasing the number of computer ports, modems and transmission lines needed for present and future communications requirements. It costs $650.

The 8540 phone line crossover switch allows the operator to use a "chaining" technique in which a single modem or phone line acts as a backup for several other modems or phone lines. The operator can manually reverse the two-wire or four-wire connection between two modems and two phone lines using a two-position switch mounted on the front panel.

The 8540 costs $180, IDS said from 7 Wellington Road, Lincoln, R.I. 02865.



The Model 8540 crossover switch reverses two- or four-wire connections between two modems and two phone lines.

Unit Links IBM CPUs With PDP-11

BOHEMIA, N.Y. — Periphonics Corp. has introduced an interface that provides a channel connection between an IBM byte multiplexer, block multiplexer or selector channel and a Digital Equipment Corp. PDP-11 minicomputer.

The IU 360/370 runs in burst and byte modes in all three channels, according to a Periphonics spokesman. It is supported under DEC's RX-11M operating system and appears to an IBM or IBM-compatible mainframe as a standard IBM device.

The interface is a DEC Unibus peripheral that uses standard PDP-11 architecture, he added.

The user can connect as many as four IU 360/370s to a single PDP-11, thereby allowing channel communication between as many as four IBM or IBM-compatible mainframes and a single PDP-11, the spokesman said.

The interface has been available in another form for the last decade, used to emulate IBM tape drives, CRT controller/displays or a telecommunications line controller in Periphonic's T-Comm 7 front-end processor. It is now available by itself in a rack mount.

The IU 360/370 costs $10,000, the spokesman said from 75 Orville Drive, Bohemia, N.Y. 11716.

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COMPUTERWORLD
Computer Business News
CW COMMUNICATIONS/INC.

A scanning/spot-beam satellite proposed for long-haul digital communications offers advantages not available in any satellite in the sky today.

SCANNING SPOT BEAMS

A New Approach To Satellite Communications

Douglas O. Reudink and Yu S. Yeh

Traveling above the earth someday in an orbit 23,000 miles away may be a new kind of communications satellite quite unlike any now in service. Instead of constantly showering one or two wide-beam signals over the entire U.S. as satellites do now, the new system would aim narrow beams of concentrated microwave energy at specific small earth stations. The beams would sweep the country rapidly, much like an electron beam scans a TV picture tube.

This scanning/spot-beam satellite could increase the capacity of satellite systems and make digital communications services more widely available to businesses. It would also be more reliable and require less transmitter power of smaller earth-station antennae than present systems.

The scanning satellite is based on a new combination of two familiar technologies — high-speed digital transmission and the steerable-beam antenna. Now used principally for radar, this kind of antenna is a familiar sight at airports. As the antenna rotates, it transmits and receives bursts of microwave-radio-frequency energy. In the scanning/spot-beam satellite, however, the antenna does not move. Instead, it is aimed electronically.

In operation, the beam of the scanning satellite would aim at an earth station for just a few microseconds. In that time, the station would receive and transmit a burst of high-speed digital information. The digits may be encoded voice, video, data or a combination of the three.

Having collected and delivered its messages, the beam would move rapidly to another station. The beam's travel pattern and "on" times could be programmed to meet the differing traffic requirements of each station and users it serves.

Since the antenna would concentrate energy onto a small spot around the earth station, it would be possible to use a relatively low-power satellite transmitter and still provide a strong signal to each station. Today's satellites, in contrast, must have high-power transmitters to compensate for the weakening of the received signal because of its dispersion over the entire country.

Because a smaller transmitter wouldn't need as much power-generating equipment, the size, weight and cost of the satellite and its launch rocket could be reduced. On the other hand, if a high-power transmitter were used, the concentration of its energy by the spot-beam antenna would produce a more powerful received signal. So the diameter of the earth-station antenna could be reduced from, say, 30 feet to 10 feet.

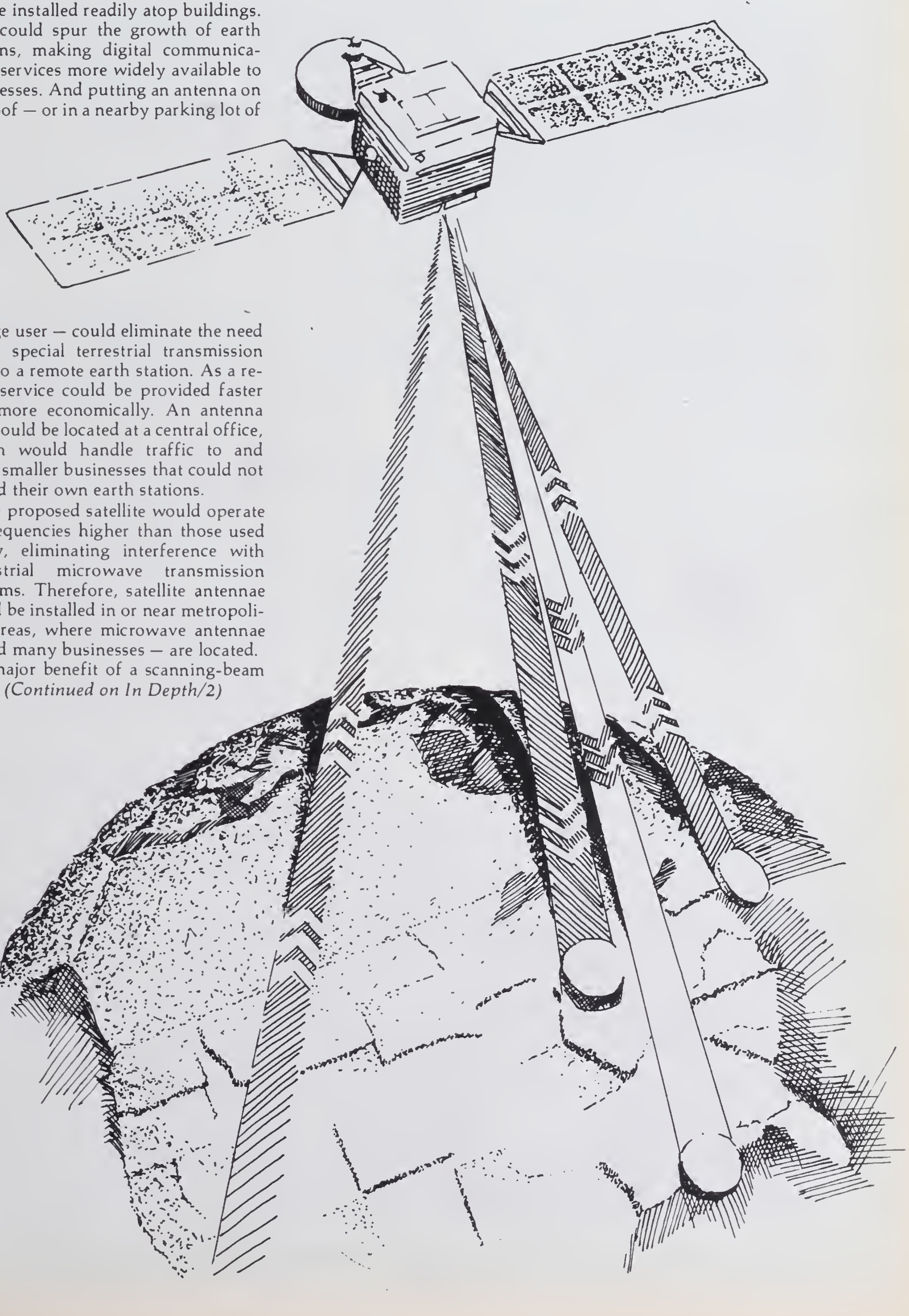
On the Roof

Small antennae are less costly and can be installed readily atop buildings. This could spur the growth of earth stations, making digital communications services more widely available to businesses. And putting an antenna on the roof — or in a nearby parking lot of a large user — could eliminate the need for a special terrestrial transmission link to a remote earth station. As a result, service could be provided faster and more economically. An antenna also could be located at a central office, which would handle traffic to and from smaller businesses that could not afford their own earth stations.

The proposed satellite would operate at frequencies higher than those used today, eliminating interference with terrestrial microwave transmission systems. Therefore, satellite antennae could be installed in or near metropolitan areas, where microwave antennae — and many businesses — are located.

A major benefit of a scanning-beam

(Continued on In Depth/2)



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(Continued from In Depth/1)

system is an increase of the satellite's channel capacity through the reuse of transmission frequencies. In today's satellites, antenna beams are very broad. To prevent them from overlapping, and thus interfering with each other, signals of the same frequency from a satellite must be separated by a thousand or more miles. Since the beam of a scanning satellite is narrow, as many as 10 beams of the same frequency could operate simultaneously within the continental U.S.

Another important feature of the scanning beam concept is that the method of transmitting information allows hundreds of earth stations to be served easily. This stems from the time-division, or pulsed, method of transmission, where a single-frequency channel is "shared." In this process, packets of digits are assigned to time slots and are transmitted in sequence to each of the users served by an earth station.

The system would have several groups of two beams. One beam of each pair would receive signals; the other would transmit them.

Typical Message Delivery

Here's an example of how the system would work. The receiving beam of one pair first would sequentially receive three messages from a West Coast station. The transmitting beam would then aim east to deliver the first message, swing northeast with the second, then point west to deliver the third. An instant later, traffic might be gathered from the northeast station and distributed to one of the others, including the West-Coast station

Eventually all stations in the network would be scanned and the process repeated. This would happen in microseconds, so the user would be unaware that transmissions were not continuous.

Consider a user with branch locations. From the headquarters' computer terminal, data would be sent continuously on one channel — at a transmission rate of 64K bit/sec — to a nearby earth station. There, a buffer memory would collect the bits and hold them until the satellite's beam arrived for a pickup. When it did, the buffer would release the data in packets of 1,000 bits, but 10,000 times faster than they were received. This is a transmission rate to the satellite of 640M bit/sec.

The satellite's beam would then aim at the receiving earth station and transmit the packets at the same high speed. However, 640M bit/sec is much too fast for the 64K bit/sec transmission rate of the channel to the customer's branch location. To slow down the arriving packets, the receiving station's buffer memory would store the bits and release them to the customer at a steady rate of 64K bit/sec. Operation would be timed so that just as the last bit was sent from the transmitting earth station, another packet of 1,000 bits would be sent up to the satellite. With this proposed 640M bit/sec transmission rate, a single beam could handle 10,000 independent 64K bit/sec circuits for one, several or even for 10,000 customers.

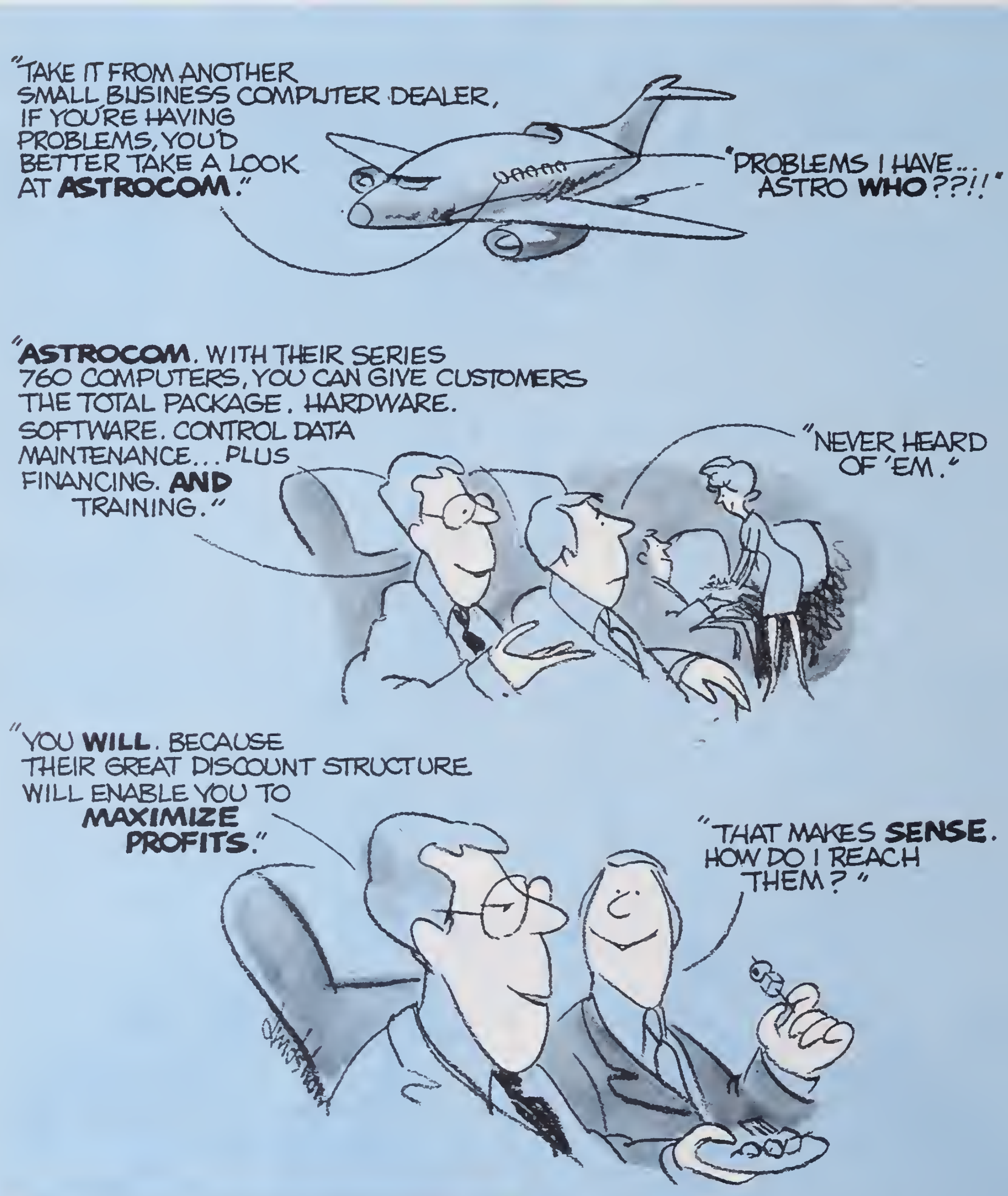
Since many customers might need several 64K bit/sec circuits, the transmission rate of the earth stations would be adjustable. Computers in the earth stations would assign each packet of digits to a specific time slot, preventing the packets from "bumping" into each other.

Operating Frequency

Devising the scanning-beam system involved decisions not only about transmission method and operating power, but also about operating frequency. In principle, any type of communications satellite can operate in any of the three frequency bands now available for satellite service: 4/6 GHz 12/14 GHz and 20/30 GHz. (The higher frequency of each pair is for upward transmission; the lower is for downward transmission.)

Satellites today operate only at 4/6 GHz, but several factors preclude using this band in the future. First, terrestrial microwave transmission systems also operate at 4/6 GHz, and their antennas tend to be in population centers. To prevent interference with terrestrial signals, satellite earth stations operating at the same frequency could not be located within or near cities — where most potential customers are. Satellites operating at 4/6 GHz also re-

(Continued on In Depth/4)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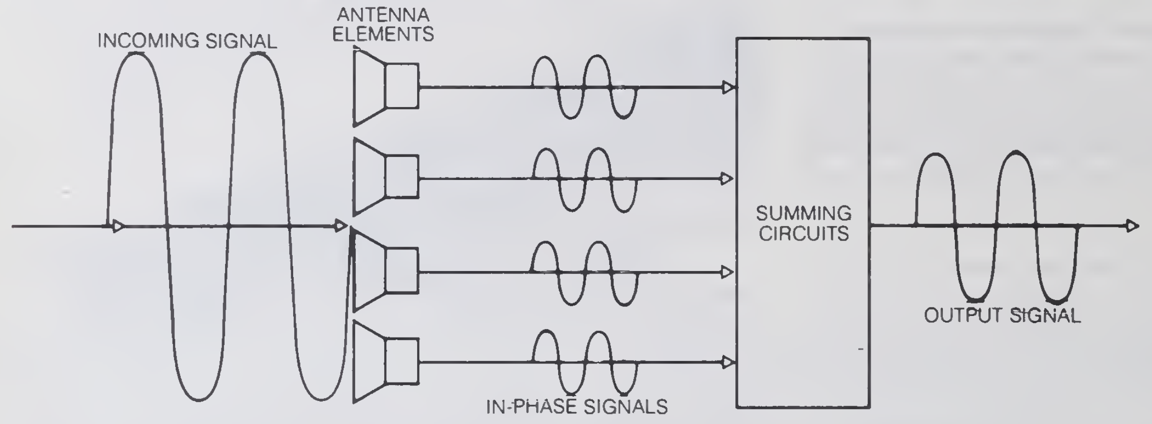


Figure 1. A signal (left) arriving perpendicular to this simplified phased-array antenna enters and leaves the four elements simulataneously — in phase. Combining these in-phase signals produces an amplified signal.

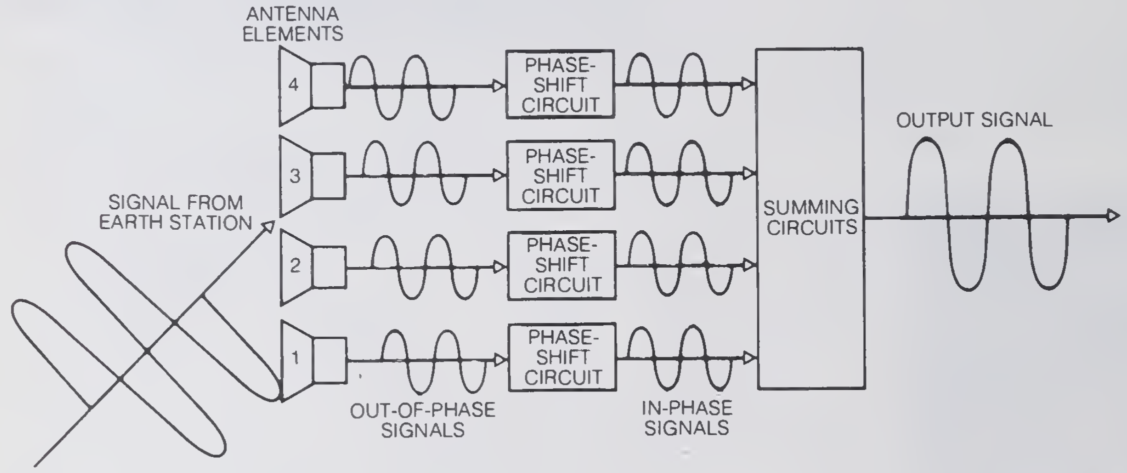
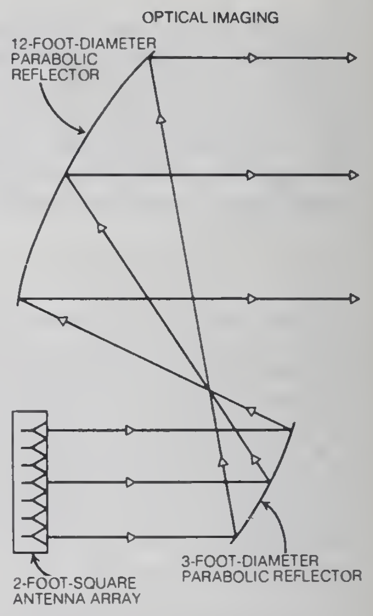


Figure 2. When a signal from an earth station impinges at an angle on a phased-array antenna, it arrives at and leaves different elements at different times. To aim the antenna at the earth station, the signals from each element are put in phase electronically. This is done by phase-shift circuits, which delay the signals from the elements, causing them to arrive at the summing circuits at the same time — in phase. Combining these signals produces an amplified signal.


OPTICAL IMAGING
12-FOOT-DIAMETER PARABOLIC REFLECTOR
2-FOOT-SQUARE ANTENNA ARRAY
3-FOOT-DIAMETER PARABOLIC REFLECTOR

Bell Labs scientist are exploring a number of designs to reduce the cost and weight of the satellite antenna. One proposal uses optical imaging with two reflectors. One, about 3 feet in diameter, is located in front of the array. The other, about 12 feet in diameter, is behind and above the array.

The 3-foot parabolic reflector magnifies the electromagnetic field of the signal transmitted from the array in the same way a visual image would be magnified. As a result, the aperture (face) of the 2-foot array "appears" in the large reflector as a 12-foot array.

Figure 3

(Continued from In Depth/2)

quire expensive 30- to 100-ft. diameter earth-station antennae.

Second, all "orbital slots" for 4/6 GHz satellites soon will be occupied. Orbital slots are positions in space where satellites are located. A minimum distance between slots, which depends on the size of the earth-station antenna, must be maintained to prevent signals to and from satellites and earth stations from interfering with each other, even with the spot-beam system.

In the highest frequency band — 20/30 GHz — rain would attenuate signals severely. This is because water molecules absorb an increasing amount of radio-frequency energy as frequency rises. To get reliable service with a conventional satellite, it would be necessary to have two interconnected earth antennae separated by 10 or more miles to reduce the likelihood of both being covered by a single heavy rainfall. With this arrangement, at least one antenna would always receive a good signal, but the system's ground-segment cost would be doubled.

Using a much more powerful satellite transmitter to "burn through" the rain could counteract attenuation. But this would require additional on-board power equipment, greatly increasing the satellite's weight and cost. Furthermore, radio-frequency components are not yet sufficiently developed for operation at 20/30 GHz.

This leaves the 12/14 GHz band, which now appears to be the most promising for a scanning-beam system. With this band there would be no interference with terrestrial microwave systems, and orbital slots are plentiful. There would still be some rain attenuation, but not as much as at 20/30 GHz.

Shifting Phases

Recent advances in antenna design, radio-frequency components and digital controllers have brought closer to reality a scanning satellite with several pairs of beams. One beam of each pair is for transmitting, the other for receiving. The scanning spot beam would be produced electronically — not by moving the entire antenna, as is often done in radar.

The proposed approach is an "electronically steered" phased-array antenna. This is a 12-foot-square structure consisting of 100 8-by-10 in. feed horns called "elements." The surface area of the elements is called the aperture. This type of antenna is aimed by changing the phases, or time relationships, of signals to and from the elements.

Consider, for example, a simple four-element antenna receiving a signal perpendicular to the elements (see Figure 1). The signal enters and leaves all elements at the same time. Combining these four in-phase signals produces an amplified signal.

If, however, the signal impinges on the antenna at an angle, it arrives at — and leaves — the elements at different

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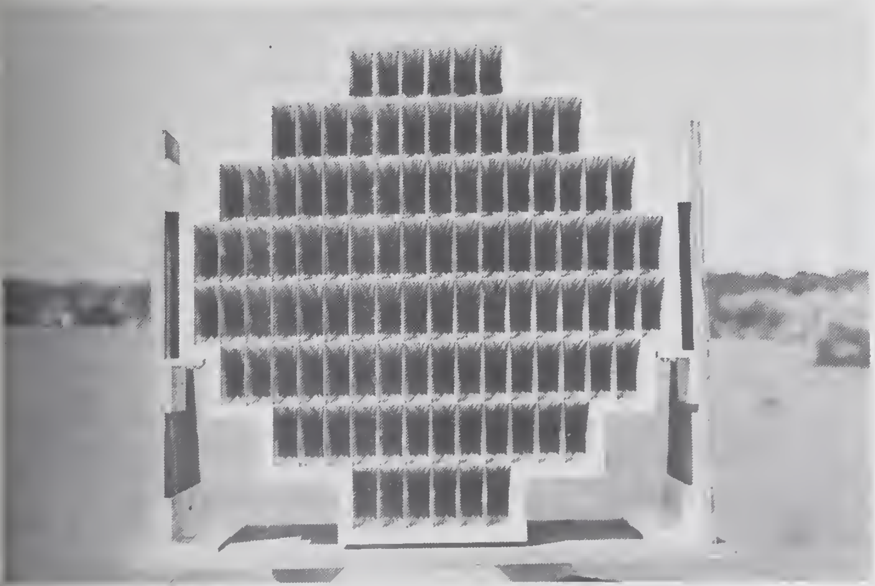
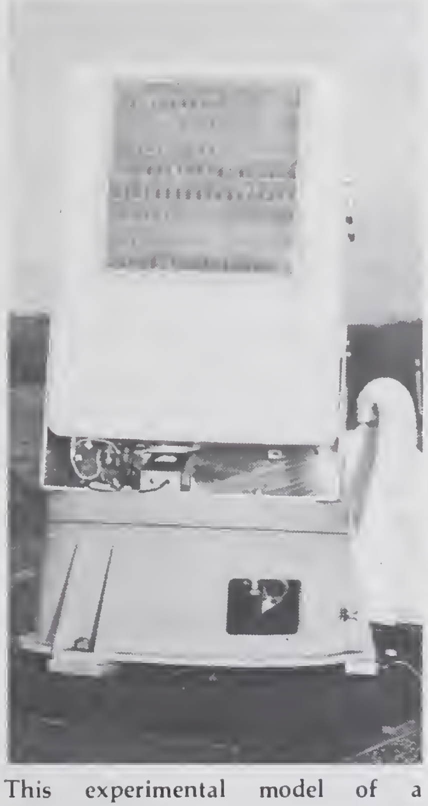
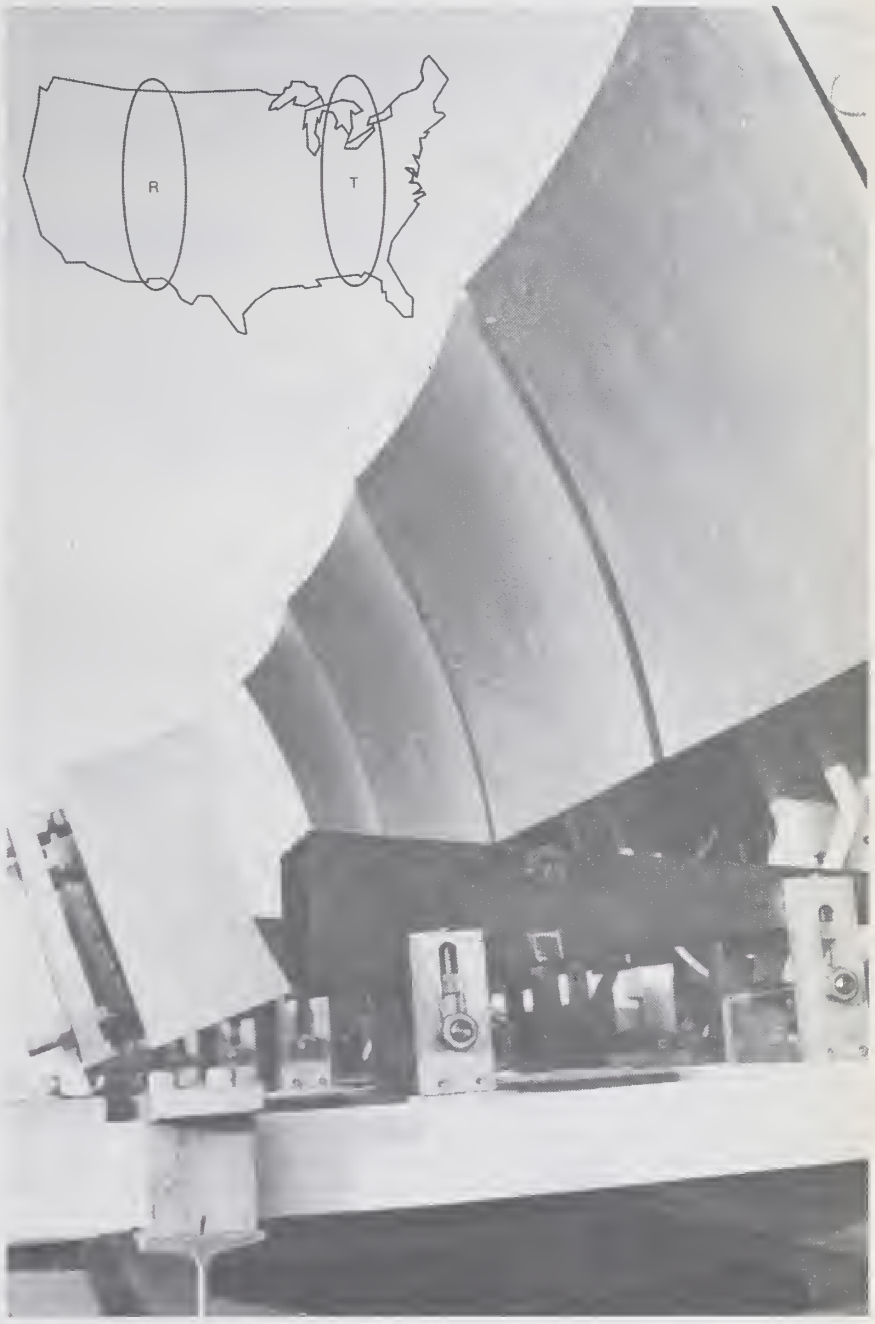


This two-foot-square Bell Labs model of an early-design experimental phased-array antenna contains 104 feed elements, or horns. An antenna would be in a fixed position on the satellite, and would be aimed by changing the time relationships — phases — of the signals going to and coming from each of the antenna elements.



This experimental model of a 144-element, phased-array feed (square area) for an antenna on board a satellite is capable of producing a scanning/spot beam which would cover the continental U.S. Although this type of antenna can scan in any direction, experiments at Bell Labs in Crawford Hill, N.J., use only 16 elements to test horizontal scanning. The transmitted signals are aimed at two receivers (not shown) about 260 feet away.



This full-size, 16-element antenna array, being developed by Bell Labs for experiments on a satelite, will produce a scanning elliptical beam. The first experimental satellite will produce two such beams, one for receiving (R), one for transmitting (T). They will sweep the country from east to west, spanning the U.S. from north to sourth and covering one-tenth its width at any instant. The size of the antenna feed-horn elements, bottom center, is reduced by optical imaging, in which signals from the horns are aimed at the small parabolic reflectors, left. These reflectors magnify the signals' electromagnetic field. The effect of this is to make the horns appear larger in the large parabolic reflectors located at the upper right of the photograph.

times, producing signals that are out of phase (see Figure 2). Combining them produces an output of reduced strength.

An output signal of maximum strength can be produced by "aiming" the antenna electronically. This is done by phase-shift circuits between the elements and the summing circuits. The phase-shift circuits impart the proper delay to each of the received signals, putting them in phase. These signals, when combined, reinforce each other, producing an amplified output signal.

The phase shifts are adjusted to suit the angle of the arriving signal. Thus, the antenna can be aimed in any direction, depending on the phase shift applied to each element.

Transmitting Mode

In the transmitting mode, the operating principle is the same, but the process is reversed. The signal to be transmitted is split into equal parts and fed to the phase-shift circuits. When the signals are not shifted in phase, they leave the elements at the same time, forming a beam perpendicular to the array. To aim the beam, the phases of the signals are shifted, causing them to leave the elements at different times. Combining delayed signals forms a beam at an oblique angle.

The phase shift of signals is controlled by high-speed logic circuits; preamplifiers and power amplifiers associated with each antenna element compensate for signal attenuation during receiving and transmitting.

A 100-element array, with each element illuminating a broad area, can produce, at any point in the country, a signal 100 times stronger than that from a conventional broad-beam satellite having the same transmitting power. These elements could also be arranged within a 12.3-foot-diameter circle in order to fit within the National Aeronautics and Space Administration's Space Shuttle — from which future satellites are likely to be launched.

Bell Labs is now developing and refining critical components needed to make the satellite work reliably and efficiently. For example, by means of optical imaging it could be possible to reduce the size, cost and weight of the array of antenna elements (see Figure 3). In addition, solid-state phase-shifting and switching devices now being designed will consume less power and operate faster than those currently available.

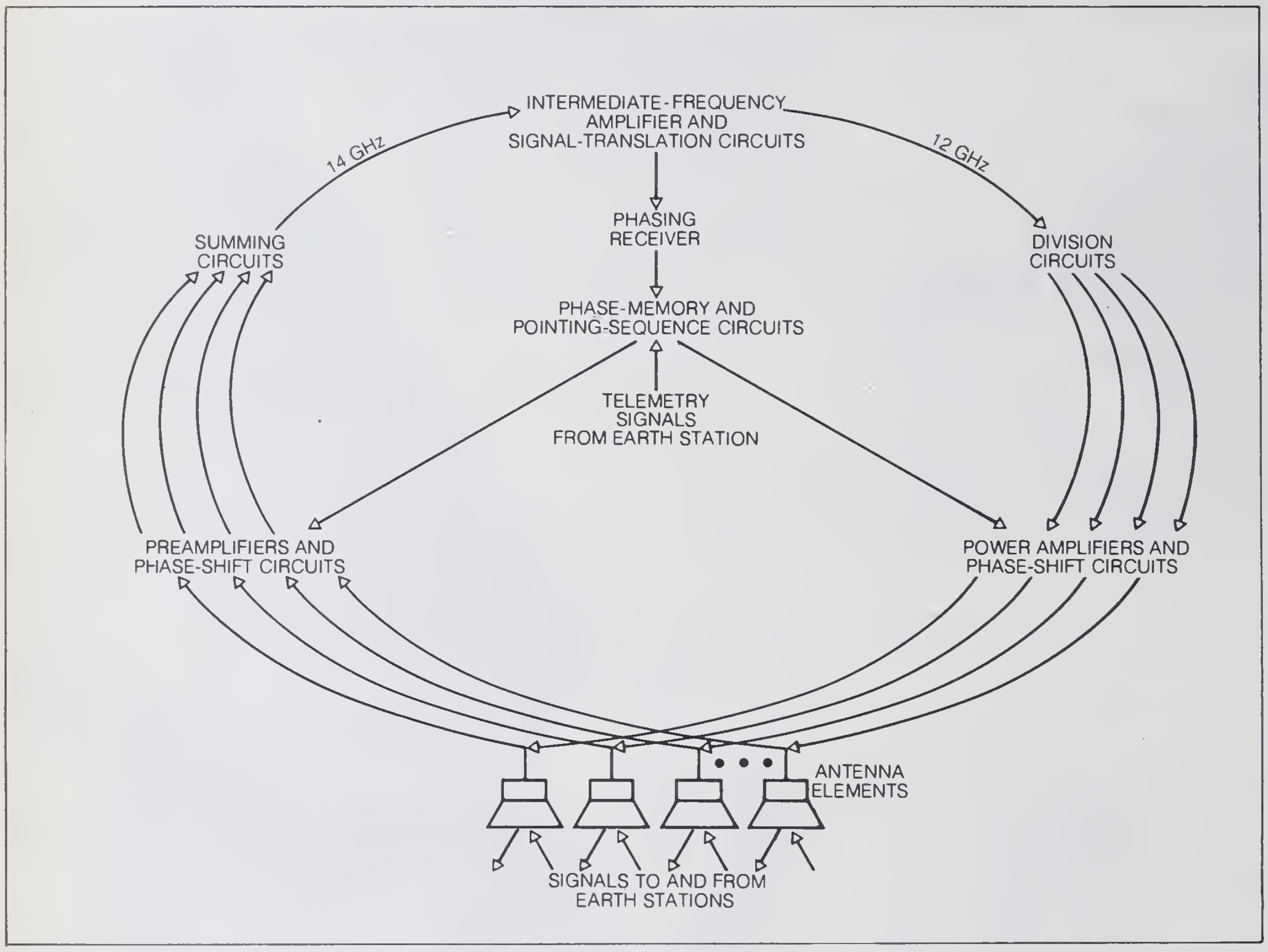
Need for Precision

The scanning-beam satellite must operate with great precision. In time, temperature variations, component aging and changes in orbital position could impair focusing and aiming of the satellite's beams. To correct such errors, changes would have to be made in the phases of the signals going to and from the antenna.

These corrections would be made during a specially reserved transmission time slot. In this time, phasing receivers in earth stations would measure the phase difference between signals from any pair of antenna elements. If the difference exceeded a specified limit, a correction signal would be sent to the satellite. This would change the memory of the microprocessor used to control beam focusing. This technique would work reliably even if a communications channel were severely impaired by a thunderstorm.

The microprocessor also establishes the duration of the receiving and transmitting time slots and identifies beam positions and the "on" duration for each slot. This microprocessor feeds phase values to the phase shifters. A prototype microprocessor controller can store in its memory 256 beam positions and 256 "on" times, plus 100K bits of information on set-

(Continued on In Depth/6)


INTERMEDIATE-FREQUENCY AMPLIFIER AND SIGNAL-TRANSLATION CIRCUITS
14 GHz
12 GHz
PHASING RECEIVER
SUMMING CIRCUITS
DIVISION CIRCUITS
PHASE-MEMORY AND POINTING-SEQUENCE CIRCUITS
TELEMETRY SIGNALS FROM EARTH STATION
PREAMPLIFIERS AND PHASE-SHIFT CIRCUITS
POWER AMPLIFIERS AND PHASE-SHIFT CIRCUITS
ANTENNA ELEMENTS
SIGNALS TO AND FROM EARTH STATIONS

This diagram shows the major functional parts of the scanning/spot-beam satellite. When the satellite is receiving, the phase-shift circuits (left) aim the beam at the transmitting earth station. Separate preamplifiers first boost the strength of the incoming signals. The phase-shifted signals then are combined in the summing circuits and are sent to intermediate-frequency amplifier and signal-translator circuits. Here, the frequency of the signal is changed from 14 to 12 GHz.

The 12-Ghz signal then goes through the division circuits, where it is split into 100 signals. These signals are fed to the transmitting phase-shift circuits, amplified to about a half-watt, and fed to the individual antenna elements. The aimed signal is transmitted to the earth station.

(Continued from In Depth/5)

tings for the phase shifters (100 antenna elements x 4 bits representing the phase shift of each element x 256 beam position = 102,400 bits).

To simplify experiments, the first scanning-beam satellite will have only a 16-element antenna array, which now is under development. Instead of developing spot beams, this antenna will produce two elliptical beams. One beam is for transmitting signals, and the other is for receiving them. They will span the country from north to south, but cover only one-tenth its width (see photo on In Depth/5).

The beams will sweep from east to west. Since the beams concentrate power over only one-tenth the area of the country, the effective gain of the antenna is increased, compared with a broad-beam antenna covering the entire country. This permits the use of a lower power satellite transmitter.

The steerable-elliptical-beam satellite will operate in the 12/14 GHz band. The elliptical-beam antenna will be small enough to fit on an existing, economical Delta-class satellite and will have no effect on its 4/6 GHz antenna.

The elliptical-beam satellite equipment will be used to evaluate and refine the techniques of high-speed programmable beam steering and high-speed transmission of packets of digits. Experiments are expected to provide information on overall system concepts, automatic calibration of antenna array elements, stability of phased-array antennae in space and operation of high-speed controlled-logic circuits in space.

Data also will be obtained on signal synchronization with variable-length transmission paths, as well as operation of 12/14 GHz solid-state receivers and transmitters and programmable phase shifters. This satellite is expected to be launched in the mid-1980s.

Lab Experiments

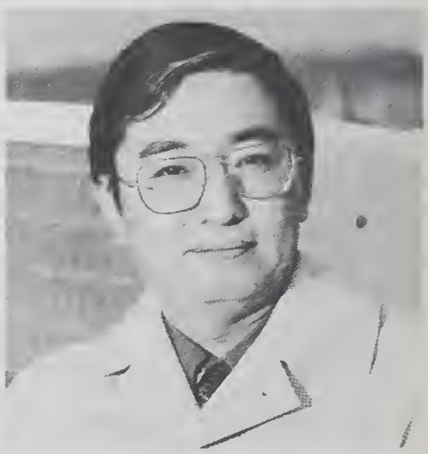
Laboratory experiments are being performed at Bell Labs in Holmdel, N.J., using a 2-foot square, 144-element array. In this setup, a TV signal from a videotape recorder is modulated and converted to a higher frequency. Under supervision of a solid-state controller, the beam transmitted by the array is scanned between two receivers. These tests have verified rapid beam forming and switching, the ability to maintain the phase of the array and the performance of the microprocessor control system.

The scanning beam satellite combines, in a powerful way, digital communications and the steerable-beam antenna. The concept is expected to make possible universal coverage and increased usefulness and capacity of future communications satellites. For users, this could mean improved service at reduced cost.

Douglas O. Reudink is director of the Radio Research Laboratory at Bell Labs in Holmdel, N.J.

Reudink joined Bell Labs in 1965 as an electronics systems researcher. In 1972 he was appointed head of the Satellited System Research Department, where he was responsible for research related to the use of satellites in future communications systems. He was appointed to his present position in 1979.

Reudink earned a B.A. degree in physics from Linfield College, Ore. and a Ph.D. from Oregon State University.



Yu S. Yeh is a member of the Satellite System Research Department at Bell Labs, Holmdel, N.J., where he is involved in research on new satellite systems, concepts, design and modulation techniques.

Yeh joined Bell in 1967 as a member of the Radio Transmission Research Department. He began his present assignment in 1972.

He received a B.S.E.E. degree from Taiwan University and M.S.E.E and Ph.D. degrees from the University of California.

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Canonical Data Base Analysis And Design

"The time has come for the widespread adoption of an implementation-independent data base analysis in view of the rapidly changing data base philosophies — hierarchical, network or relational — and finally, the data base machine itself."

By V. Venkatakrishnan and R. L. McKee

The concept of analyzing, designing, developing and testing systems in a structured, top-down fashion is becoming increasingly popular and justifiably so. Powerful automated data dictionary/directory (DD/D) packages have significantly contributed to the structured approach because of their crucial role. In this context, it is somewhat interesting if not puzzling that the art of data base analysis and design has not kept pace with systems analysis.

We feel that the time has come for the widespread adaptation of an implementation-independent data base analysis in view of the rapidly changing data base philosophies (hierarchical, network or relational data bases) and the data base machine itself.

James Martin, in his book *Computer Data Base Organization*, defines the canonical schema as "a model of data which represents the inherent structure of that data and hence is independent of individual applications of the data and also of the software or hardware mechanisms which are employed in representing and using the data."

The purpose of this article is to describe the application of formal structured techniques to the data base analysis and design of a system in the Aetna Insurance Co., a division of the Connecticut General Insurance Corp. The end result was a canonical structure for each data base.

We certainly do not claim that the approach used here is completely original. It is based on an excellent course taught by the IBM Education Center. The method itself is described by Martin in the book cited above. Our major contribution is a design assurance phase, as will be explained later.

Components of Implementation

The data base implementation effort for a specific system consists of analysis, design and physical implementation, in that order. Analysis is performed using the normalization criteria of Dr. E.F. Codd and is completely independent of the specific properties of the data base management system (DBMS) itself. Design and physical implementation, on the other hand, are dependent on the DBMS which, in our case, happens to be IBM's Information Management System (IMS).

Our system is called System Maintenance Activity Reporting and Tracking (Smart). Its primary objective is to produce status reports for DP users and detail status reports, summary reports and performance statistics for DP management from a data base of work requests.

The system consists of daily, monthly and on-request portions. Data relating to work requests, systems and user departments is entered and updated by DP personnel in an on-line environment. A hard-copy log of the day's update is produced in a batch run each night. Monthly batch runs produce all of the scheduled reports and perform truncation and purge functions.

Additional features of the system are a series of on-request reports and a "staffing model." The anticipated average daily volume for the on-line functions is 100 update transactions and 10 inquiries.

The three major analysis phases are the local view process, data structuring and design assurance.

I. Local View Process.

A local view is a diagrammatic representation of all the data elements and their relations as they pertain to a specific function. In the Smart system, the term "module" has been used to denote a local view function. This phase can be divided into the following steps:

1. Gather data.
2. List data elements.
3. Normalize data structures.
4. Map data structures.
5. Record the entry data element.
6. Draw parent-child graph for keys only.

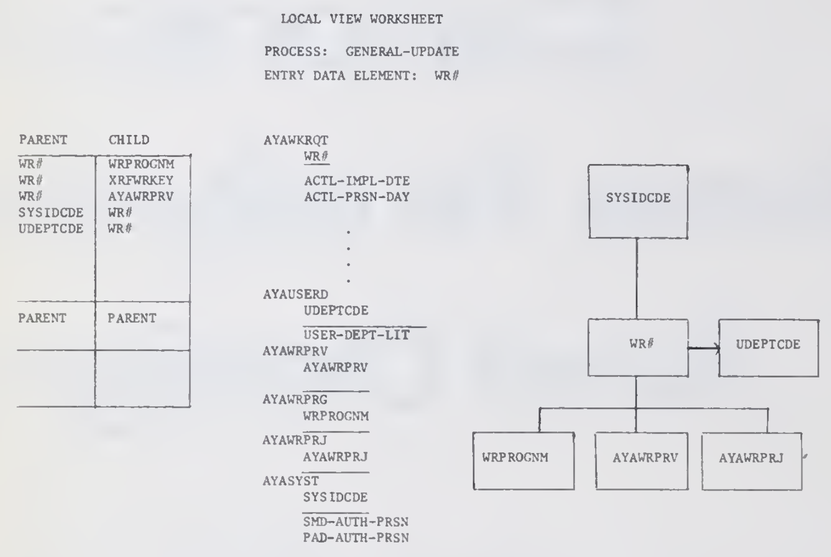
Thirty-four local views had to be processed for the Smart system.

Gather data. The project analyst gathers data in the business specification phase of the system life cycle through several interviews with prospective users and documenting the data in the dictionary (MSP, Inc.'s Datamanager). Occasional interfaces with the data base analyst/administrator may be required.

List the data elements. This step consists of identifying the entities, grouping data elements by entity and selecting unique identifiers (key).

The entire local view process will be illustrated by the Smart module (function) General-Update shown in Figure 1. The entities identified are AYASYST, AYAWKRQT, AYAUSERD, AYAWRPRV, AYAWRPRG and AYAWRPRJ. The unique identifiers for each entity are shown underscored.

(Continued on In Depth/8)



LOCAL VIEW WORKSHEET

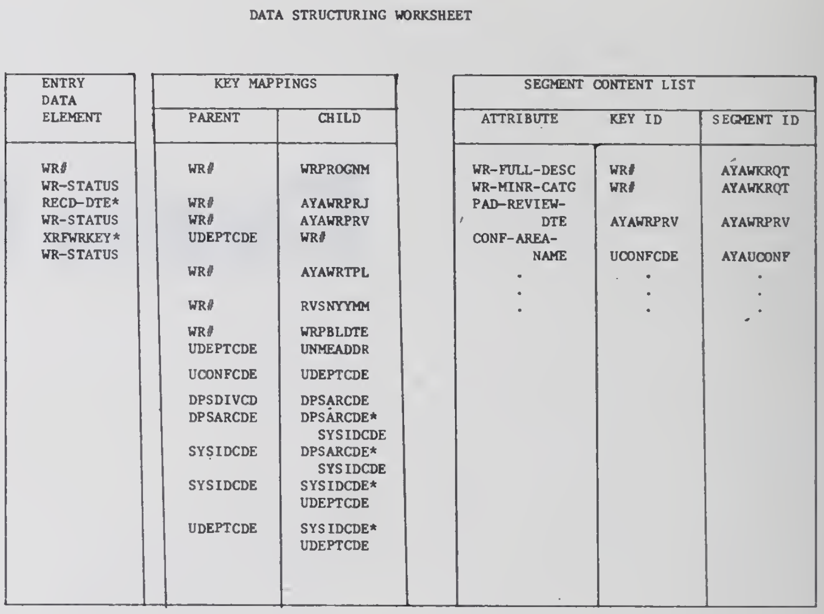
PROCESS: GENERAL-UPDATE

ENTRY DATA ELEMENT: WR#

PARENT	CHILD
WR#	WRPROGNM
WR#	XRFWRKEY
WR#	AYAWRPRV
SYSIDCDE	WR#
UDEPTCDE	WR#
PARENT	PARENT

AYAWKRQT
WR#
ACTL-IMPL-DTE
ACTL-PRSN-DAY
.
.
.
.
AYAUSERD
UDEPTCDE
USER-DEPT-LIT
AYAWRPRV
AYAWRPRV
AYAWRPRG
WRPROGNM
AYAWRPRJ
AYAWRPRJ
AYASYST
SYSIDCDE
SMD-AUTH-PRSN
PAD-AUTH-PRSN

Figure 1



DATA STRUCTURING WORKSHEET

ENTRY DATA ELEMENT
WR#
WR-STATUS
RECD-DTE*
WR-STATUS
XRFWRKEY*
WR-STATUS

KEY MAPPINGS	
PARENT	CHILD
WR#	WRPROGNM
WR#	AYAWRPRJ
WR#	AYAWRPRV
UDEPTCDE	WR#
WR#	AYAWRTPL
WR#	RVSNYYMM
WR#	WRPBLDTE
UDEPTCDE	UNMEADDR
UCONFCDE	UDEPTCDE
DPSDIVCD	DPSARCDE
DPSARCDE	DPSARCDE* SYSIDCDE
SYSIDCDE	DPSARCDE* SYSIDCDE
SYSIDCDE	SYSIDCDE* UDEPTCDE
UDEPTCDE	SYSIDCDE* UDEPTCDE

SEGMENT CONTENT LIST		
ATTRIBUTE	KEY ID	SEGMENT ID
WR-FULL-DESC	WR#	AYAWKRQT
WR-MINR-CATG	WR#	AYAWKRQT
PAD-REVIEW-DTE	AYAWRPRV	AYAWRPRV
CONF-AREA-NAME	UCONFCDE	AYAUCONF
.	.	.
.	.	.
.	.	.

Figure 2

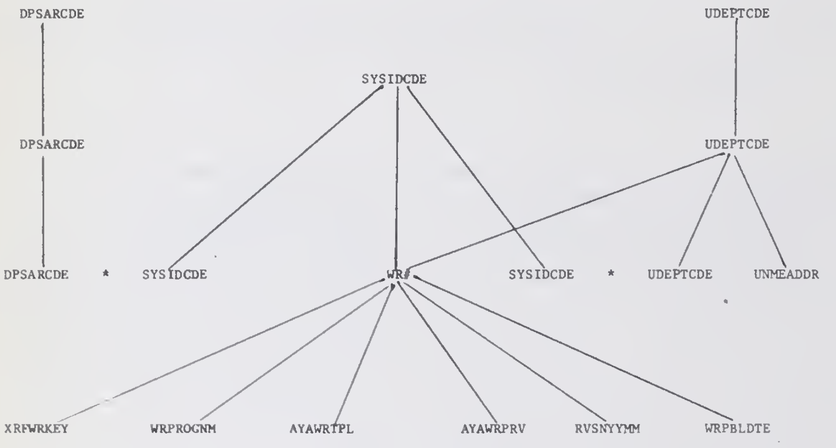
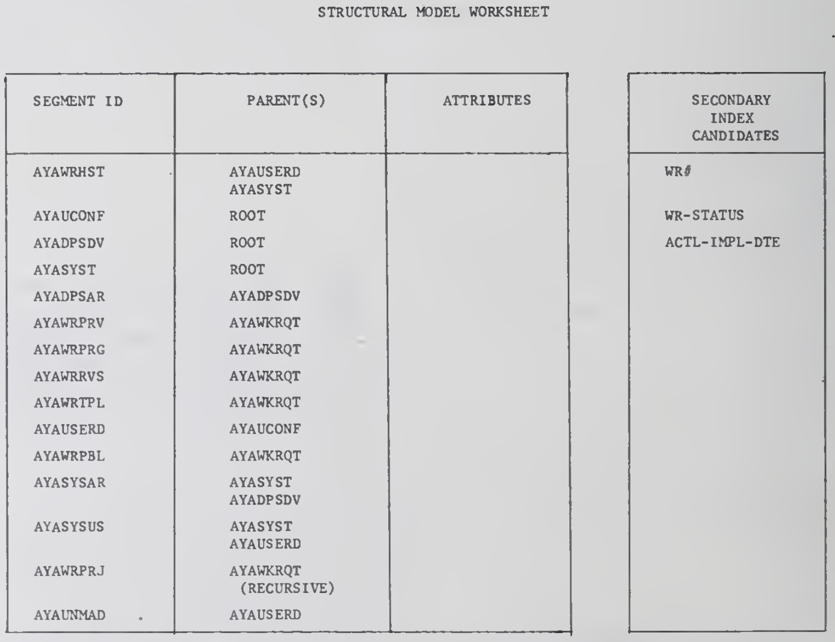


Figure 3



STRUCTURAL MODEL WORKSHEET

SEGMENT ID	PARENT(S)	ATTRIBUTES
AYAWRHST	AYAUSERD AYASYST	
AYAUCONF	ROOT	
AYADPSDV	ROOT	
AYASYST	ROOT	
AYADPSAR	AYADPSDV	
AYAWRPRV	AYAWKRQT	
AYAWRPRG	AYAWKRQT	
AYAWRRVS	AYAWKRQT	
AYAWRTPL	AYAWKRQT	
AYAUSERD	AYAUCONF	
AYAWRPBL	AYAWKRQT	
AYASYSAR	AYASYST AYADPSDV	
AYASYSUS	AYASYST AYAUSERD	
AYAWRPRJ	AYAWKRQT (RECURSIVE)	
AYAUNMAD	AYAUSERD	

SECONDARY INDEX CANDIDATES
WR#
WR-STATUS
ACTL-IMPL-DTE

Figure 4

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(Continued from In Depth/7)

Normalize data structures. A data structure or relation is said to be normalized if it does not contain repeating groups. Three levels of normalization are usually distinguished in the increasing order of simplicity. The purpose of the whole normalization procedure is to organize data into a more usable form.

The data structure is in first normal form (1NF) if it does not contain any repeating groups. The data structure is in second normal form (2NF) if all the attributes are fully functionally dependent on the primary key. The data structure is in third normal form (3NF) if, in addition to the above requirements, no attribute is functionally dependent on any other attribute.

By inspection, we note that all the data structures in Figure 1 are in 3NF. Several other local views were not this simple in that they had totally unnormalized structures. We reduced all of these to 3NF by progressively splitting them into separate relations.

Map data structures. The purpose of mapping data structures is to map all the *keys* of the local view into a parent-child (one-to-many) relationship. This requires a thorough knowledge of the operation and process description and thus is mostly a project analyst function.

It is also possible for a local view to have parent-parent (many-to-many) relationship of keys. If any such relation exists, it is mapped under parent-parent columns. It also has to be broken down into two parent-child relations using a common segment. Figure 1 shows the mapping of the keys for General-Update on the left-hand side.

To summarize, this step consists of mapping between keys and resolving the parent-parent relation.

Record entry data element. In this step, the entry data element for the process is identified and recorded against "Entry Data Element" (Figure 1).

Draw parent-child graph. The

parent-child relation of keys, which has been determined and shown in tabular form, is now transformed into a pictorial hierarchical representation.

This step completes the local view process.

II. Data Structuring.

The objectives of this phase are to synthesize data element relationships from local views into a structural model and to resolve structure conflicts.

Structure conflicts (hierarchical conflicts) usually arise because of poor naming conventions. They rarely occur when a good data dictionary is used.

The following steps are involved in this phase:

1. Transfer key mappings and entry data elements from local view worksheet to data structuring worksheet.
2. Construct parent-child graph for keys from the data structuring worksheet.
3. Transfer attributes and their associated keys from the local views to the segment content list.
4. Determine segment content.
5. Select root segments and record the content on the structural model worksheet.

Transfer key mappings. The key mappings and entry data elements from each local view are transferred to the data structuring worksheet (Figure 2). Local view sheets are processed one at a time and no duplicate entries are made.

Construct parent-child graph. From key mappings in the data structuring worksheet, a parent-child graph is constructed (Figure 3). It is important, at this point, to delete nonessential paths. A nonessential path is defined as a path spanning more than one level of hierarchy.

Transfer attributes and keys. The attributes and their associated keys are transferred from the local view worksheets to the data structuring worksheet under the heading Segment Content List. In doing so, the following rules must be observed:

- Process only one local view at a time.
- Do not add duplicates.
- If an entry exists for an attribute associated with a different key, record both keys.
- Resolve attributes that are also keys:

a) This implies a key-to-key association in the segment content list, thus indicating an error in normalization.

b) If a path exists, remove key-to-key association.

c) If a path does not exist, reexamine the local view — something is wrong.

This step is highly simplified by the use of the data dictionary. In fact, the segment content list shown in Figure 2 is only a representative sample. The actual list, which is much longer, was compiled directly from the dictionary. Most of the rules stated above are automatically followed when the data dictionary is used.

Determine segment content. The purpose of this step is to determine the highest level keys for the attributes. If a given attribute has only one associated key, that key is recorded under the Segment ID column. If the attribute has more than one key, only the highest level key is recorded. Again, the use of the data dictionary simplified this step considerably.

Select root segments. For this purpose, the structural model worksheet (Figure 4) is used. Segments are listed under the Segment ID column. Parents are entered under the Parent's column. For those segments that are identified as roots, the word "root" is used in lieu of the parent name. The attributes for each segment are too numerous to fit into the model worksheet and in practice were available as dictionary reports.

From the data structuring worksheet, any entry data element that is not also a root key (Figure 4) is entered in the structural model worksheet as a possible candidate for secondary index.

III. Design Assurance.

The objectives of this phase are the following:

1. Arrive at the final structural hierarchy of all data bases of the system.
2. Integrate the data bases.
3. Verify that all local views can be satisfied by the design in 2.
4. Refine the structure.

Final structural hierarchy. The hierarchy is the same as Figure 3 except

(Continued on In Depth/12)

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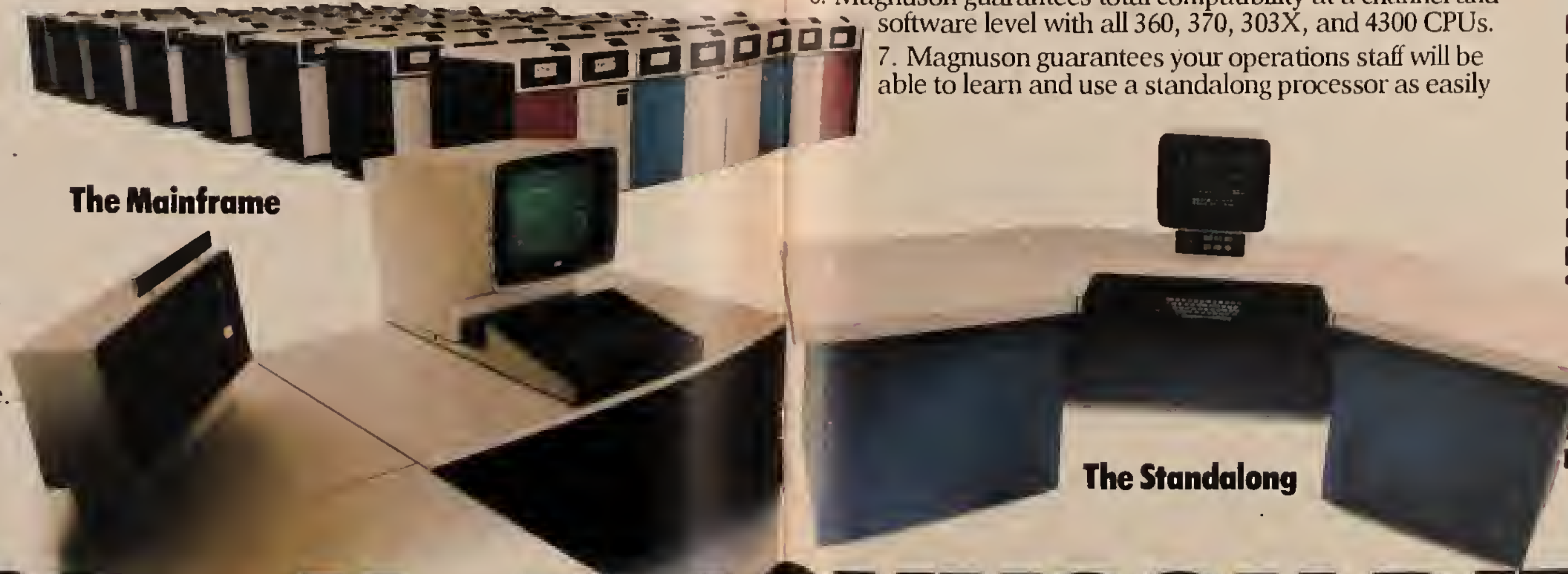

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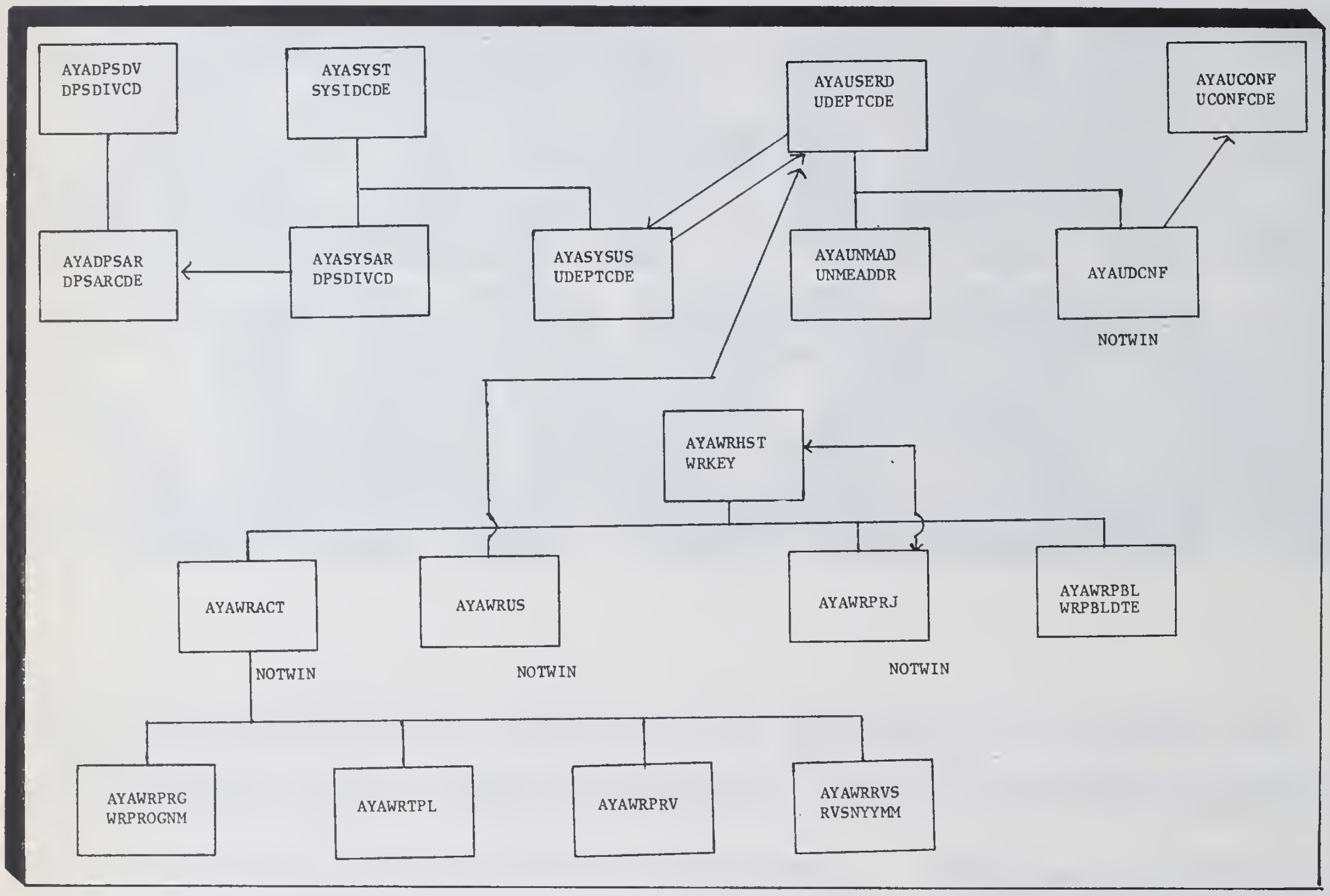


Figure 5

(Continued from In Depth/9)

that both segments and their keys are shown in the traditional "boxed" form. Only physical paths are mapped at first (Figure 5). Logical paths are reserved for the next step.

It is also advisable, if possible, to identify segments that can occur only once per parent (NOTWIN). The other differences between the final structure and Figure 3 are explained in detail later. For each segment, the name is shown at the top and the key ID at the bottom.

Data base integration. To properly integrate the data bases of the system, local views are examined for parent-parent relations. The fact that these relations were resolved into component parent-child relations is immaterial.

Logical pointers are now introduced (Figure 5). If only unidirectional relation is necessary, only one arrow pointing to the logical parent (LP) is drawn. Bidirectional relations are shown by the LP and logical child (LC) pointers. It can happen that logical relations are needed within the same physical data base. Such a recursive relation is represented by a "double-header."

All three types of pointers are required in the Smart system. The pointer options may need reexaminatioin during physical implementation.

Verification. The purpose of this step is to ensure that the physical design we have synthesized is, in fact, necessary and sufficient to support the requirements of all the local views. In doing this, one local view is processed at a time. If a given local view can be satisfied through physical structure alone, only an inspection of Figure 5 is needed.

For each local view requiring a logical relation, a physical implementation of the local view is constructed. Figure 6 represents such a construction for the view General-Update. Note that this is *not* a restructured hierarchy or logical view. Each such physical implementation is compared with the overall physical structure (Figure 5) to ensure that the former represents a domain of the latter.

Refinement. If any local view cannot be satisfied, iterate through the steps of Phase 2 and objectives 1 and 2 of this phase. Iteration may also be necessitated by any late revision of local views.

Figure 5 is the final product after refinement. Two changes from the structure represented by Figure 3 were made to reduce complexity and improve performance, especially in the on-line mode. It became apparent that the major reason for the relation between systems (AYASYST) and work requests (AYAWKRQT) was to identify a specific work request uniquely.

But the application also required that the access be direct and efficient for on-line performance. This requirement was satisfied by physically concatenating system identifier (SYSIDCDE) with WR#. The planned redundancy is thus justifiable.

The other major improvement was to split the work request segment AYAWKRQT into work request history (AYAWRHST) and work request active (AYAWRACT) segments. The segment AYAWRHST is one of a permanent nature while the segment AYAWRACT and its dependents are comparatively volatile. This design alteration also has the objective of optimizing efficiency and performance. With the refined structure, the need for secondary indexing was eliminated.

The whole process of analysis and design took three person-weeks. The result of this type of formal analysis and design is a physical structure about which both the project analyst and the data base analyst are confident. Another advantage is that the resultant structure lends itself to straightforward implementation. But the need for close collaboration between the project and data base analysts cannot be overemphasized.

Transaction data element analysis has not been formally considered in this approach because of its marginal importance when HD methods with direct pointers are used. Software tools such as IBM's Data Base Design Aid (DBDA) and DMWs Group's Datadesigner automate a number of steps in the process, but there is an inherent educational experience in manual analysis and design.

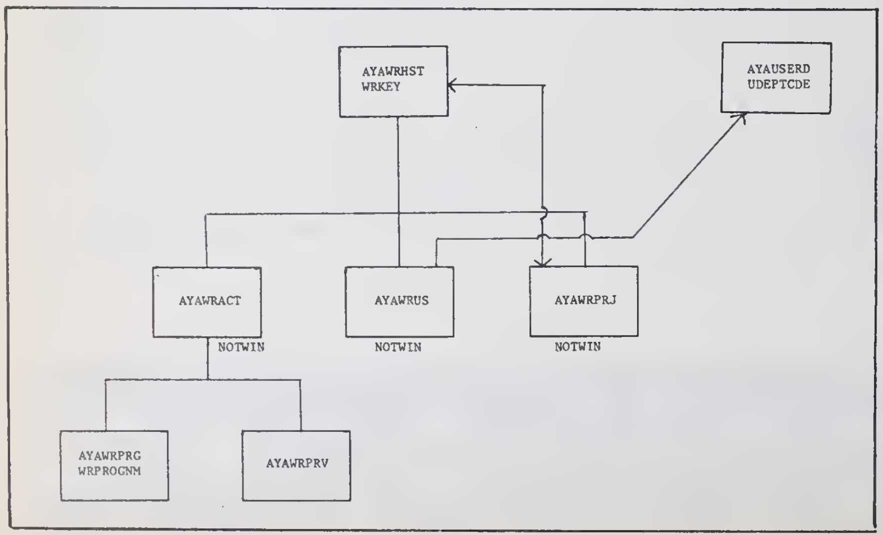
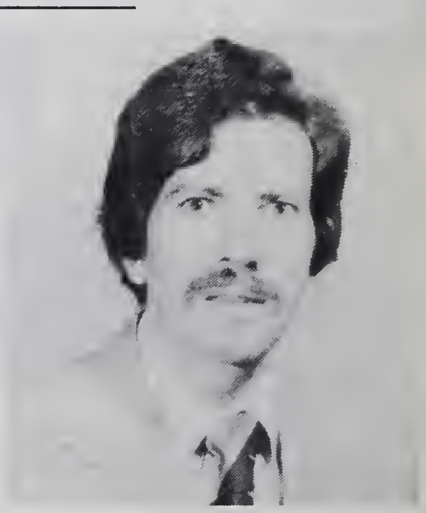


Figure 6

V. Venkatakrishnan is lead senior analyst at the Aetna Insurance Co., the Property and Casualty Division of the Connecticut General Insurance Corp., Hartford, Conn.

Venkatakrishnan, who is responsible for the data base administration function, received his degree from the University of Connecticut.



Richard L. McKee, lead senior analyst at the Aetna Insurance Co., is the project manager for Smart.

McKee is involved in the development of application systems and is keenly interested in structured techniques and project life cycle concepts. He received his master's degree from the University of Pennsylvania.

IN DEPTH

ROBOTICS

An overview of the $75 million Icam and robotics projects of the U.S. Air Force

By Gerald C. Shumaker

The U.S. Air Force is conducting an integrated computer-aided manufacturing (Icam) program and three Icam robotics projects aimed at significantly increasing aerospace productivity.

The Air Force has earmarked $75 million for the five-year program that began with fiscal year '78. The program is a long-term effort to establish a number of modular subsystems designed to provide computer assistance and tie together in a master plan the various phases of manufacturing including fabrication, distribution and the associated management hierarchy.

In essence, the Icam program provides seed money to advance the frontier of the technology. As a large user with great potential for gain, the Air Force is supplying what might be termed "risk capital" for extending the technology. With government funding, university assistance and industry cooperation, the technology can be established and applied in a totally open manner. Industry can acquire and apply the elements freely.

The specific objectives of the Icam program are the following:

- To reduce defense systems costs by developing and applying CAM technology to the fabrication of defense material.
- To establish a model for the integrated application of computer technology to all phases of production/-manufacturing.
- To improve the long-term competence and efficiency of American aerospace and related industries and increase their responsiveness to defense needs.
- To provide a mechanism for Icam technology transfer to and within American industry.
- To validate and demonstrate the cost-saving benefits and flexibility of Icam for representative elements of Air Force systems production.

Major Focus

The Icam logo (see Figure 1 on In Depth/14) is a representation of the major areas the Icam program covers.

Four rings are shown in the logo. The inner ring symbolizes the manufacturing architecture around which the entire program is centered. The second ring represents the computer itself — the mechanism required to handle the "smart" data base for the integration responsibility of Icam.

The third ring represents the tools that "connect" the shop floor to the architecture. These tools will greatly facilitate the use of sound manufacturing decisions based on group technology, simulation, mathematics, operations research and advanced planning methods.

The outer ring represents the "shop floor," and it contains both shop floor systems (fabrication, assembly, test-inspection-evaluation) and support activities (control, external functions and design). Individual modules (called subsystems) are being established in the thrusts represented by the logo according to a master plan that is extremely well thought out and constantly critiqued by private-sector review.

Some of the key phases of this master plan are shown in Figure 2 (on In Depth/14). Notice that these subsystem demonstrations may be oriented toward either the indirect cost side of manufacturing, such as the work being sponsored in the manufacturing, control area, or toward the direct (hardware) cost side, such as the near-term efforts in robotics.

These subsystems will be implemented in an evolutionary manner as the work progresses. Specifically, the Icam program recognized operating stages of increasing responsibility, complexity and susceptibility to computer enhancement. These are categorized as process, station, cell, center and factory stages, each having its own software and hardware needs and operating modes (see Figure 3 on In Depth/14). Orderly development of Icam requires proper time-sequenced resolution and coordination of each appropriate stage as it relates to a particular manufacturing process.

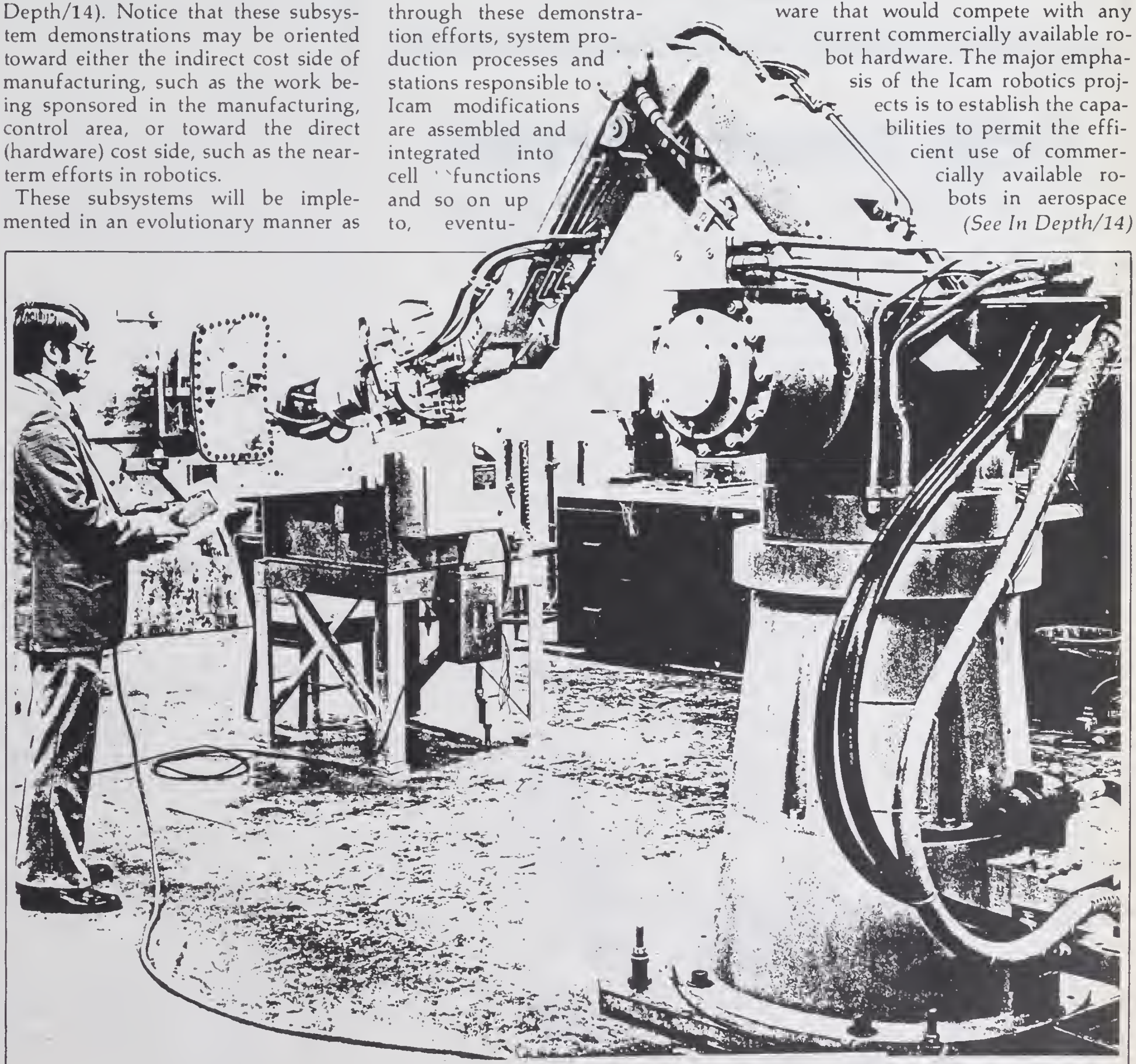
First results of the Icam program will be integrated into the lower hierarchies of the manufacturing architecture — that is, at the process and the station levels. As validations are obtained through these demonstration efforts, system production processes and stations responsible to Icam modifications are assembled and integrated into cell functions and so on up to, eventually, the more complex center and factory levels. The lower levels are advanced in performance primarily by hardware developments under Icam, while the integration required at successively higher levels depends increasingly on software.

Robotics Overview

In 1978, the Icam program initiated three separate robotics projects with three separate contractors. These projects will initially establish the hardware capabilities and software tools required for demonstration in stations (see Figure 3), then cells (later) and finally in the Icam sheet metal center.

It should also be pointed out that the Air Force is not developing any hardware that would compete with any current commercially available robot hardware. The major emphasis of the Icam robotics projects is to establish the capabilities to permit the efficient use of commercially available robots in aerospace

(See In Depth/14)



A computer-controlled robotic workstation is used by General Dynamics Corp. to drill and rout up to 150 different kinds of aircraft sheet metal panels.

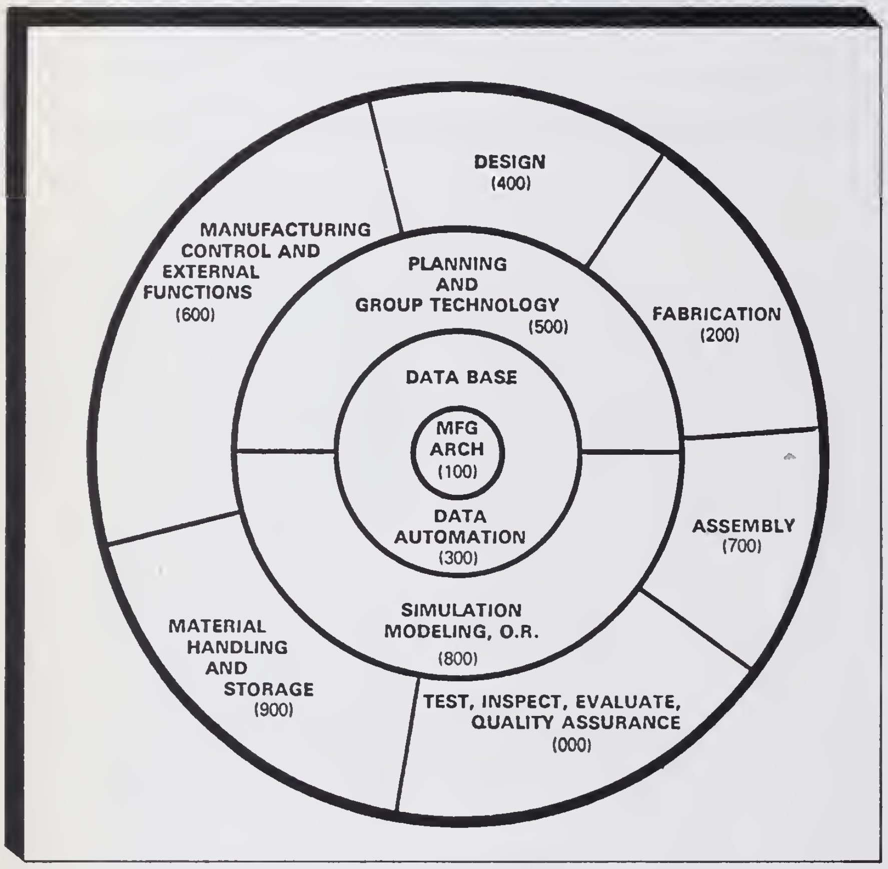

DESIGN (400)
MANUFACTURING CONTROL AND EXTERNAL FUNCTIONS (600)
PLANNING AND GROUP TECHNOLOGY (500)
FABRICATION (200)
DATA BASE
MFG ARCH (100)
DATA AUTOMATION (300)
ASSEMBLY (700)
SIMULATION MODELING, O.R. (800)
MATERIAL HANDLING AND STORAGE (900)
TEST, INSPECT, EVALUATE, QUALITY ASSURANCE (000)

Figure 1. Icam thrusts are separated into 10 areas, giving structure to the systems architecture.

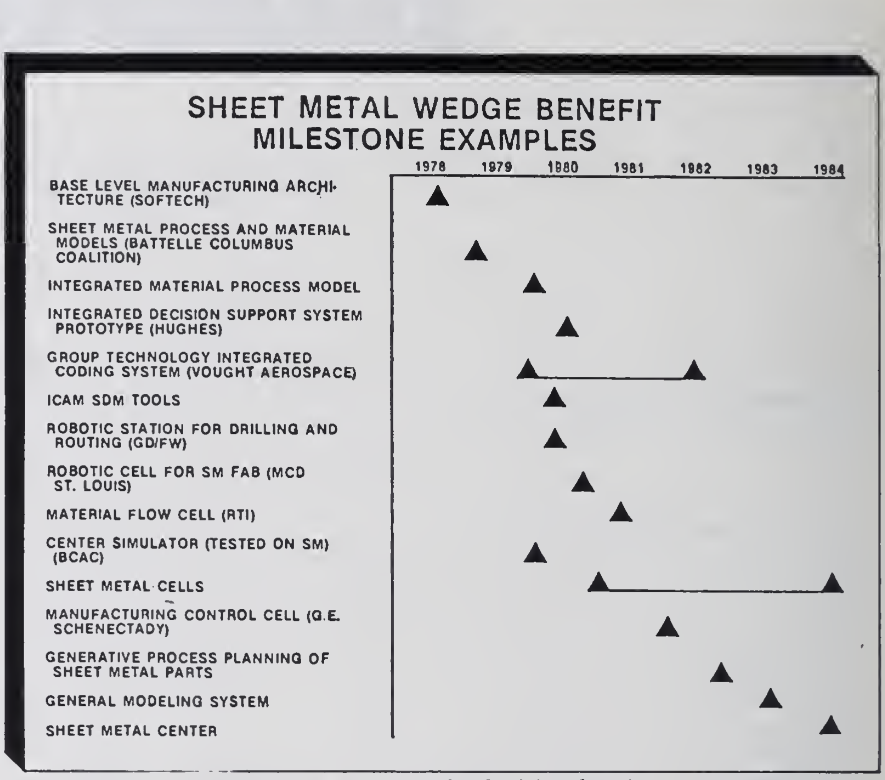


Figure 2. Milestone Examples Established for the Sheet-Metal Wedge

(Continued from In Depth/13)
manufacturing — both in today's environment and in the integrated center of the future.

The three projects are indentified by separate tasks:

Task A establishes a robotic capability using current state-of-the-art technology to develop a workstation and then a work cell for drilling and routing of aircraft sheet metal panels. The Task A contractor is the General Dynamics Corp. (Fort Worth, Texas, Division).

The second task, Task B, establishes innovative techniques that will greatly improve the programming capability of robots and the capabilitiy of the robot to interact with its environment on a real-time basis. The Task B contractor is McDonnell Douglas Aircraft Co. of St. Louis, Mo.

Finally, Task C builds upon the results of tasks A and B and plans the extension of the robotic technology into the assembly area. A physical demonstration of Task C is not currently planned. The Task C contractor is the Lockheed-Georgia Co.

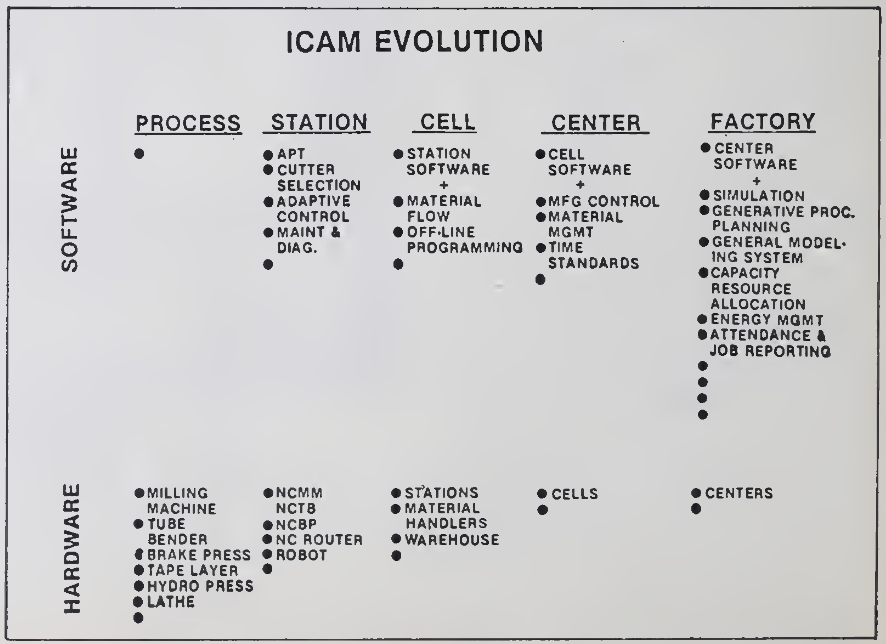
In addition, the National Bureau of Standards is under contract with the Icam project office to develop specifications and standards for software related to robots and their control systems.

Task A

The principal thrust of General Dynamics' Task A efforts is to establish robotic capability leading to the immediate application of robotics in the near term using today's technology. The specific objectives of Task A are as follows:

1) To conduct an assessment of present robotic technologies and to document the results of the assessment in a guide for application of robotics in aerospace manufacturing.

2) To demonstrate existing robotic capabilities to drill and rout aircraft panels and to form a robotic worksta-



ICAM EVOLUTION

	PROCESS	STATION	CELL	CENTER	FACTORY
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HARDWARE	● MILLING MACHINE ● TUBE BENDER ● BRAKE PRESS ● TAPE LAYER ● HYDRO PRESS ● LATHE ●	● NCMM NCTB ● NCBP ● NC ROUTER ● ROBOT ●	● STATIONS ● MATERIAL HANDLERS ● WAREHOUSE ●	● CELLS ●	● CENTERS ●

Figure 3. Manufacturing stages of Icam evolution are categorized in increasing responsibility.

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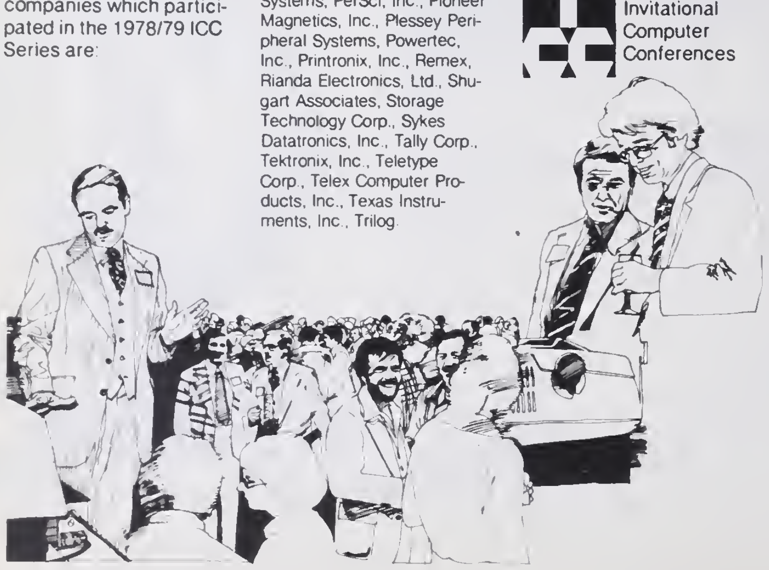

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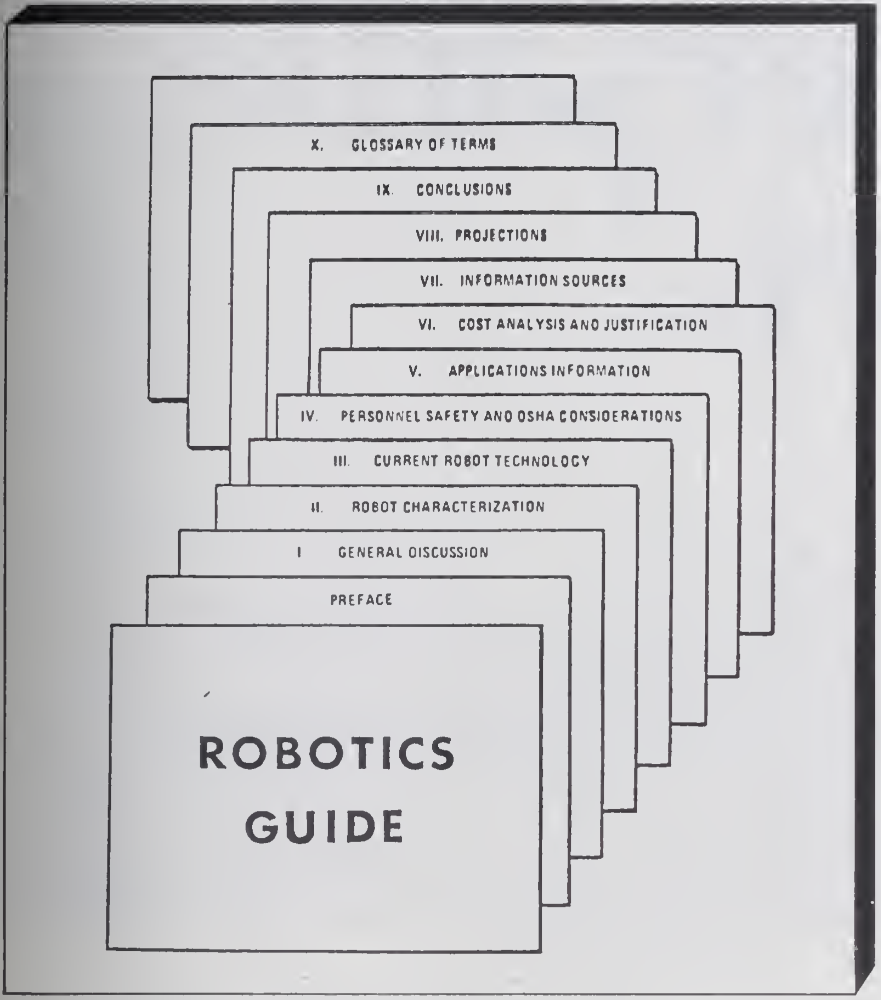
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IX. CONCLUSIONS
VIII. PROJECTIONS
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V. APPLICATIONS INFORMATION
IV. PERSONNEL SAFETY AND OSHA CONSIDERATIONS
III. CURRENT ROBOT TECHNOLOGY
II. ROBOT CHARACTERIZATION
I GENERAL DISCUSSION
PREFACE
ROBOTICS
GUIDE

Figure 4. Format of Robotics Guide

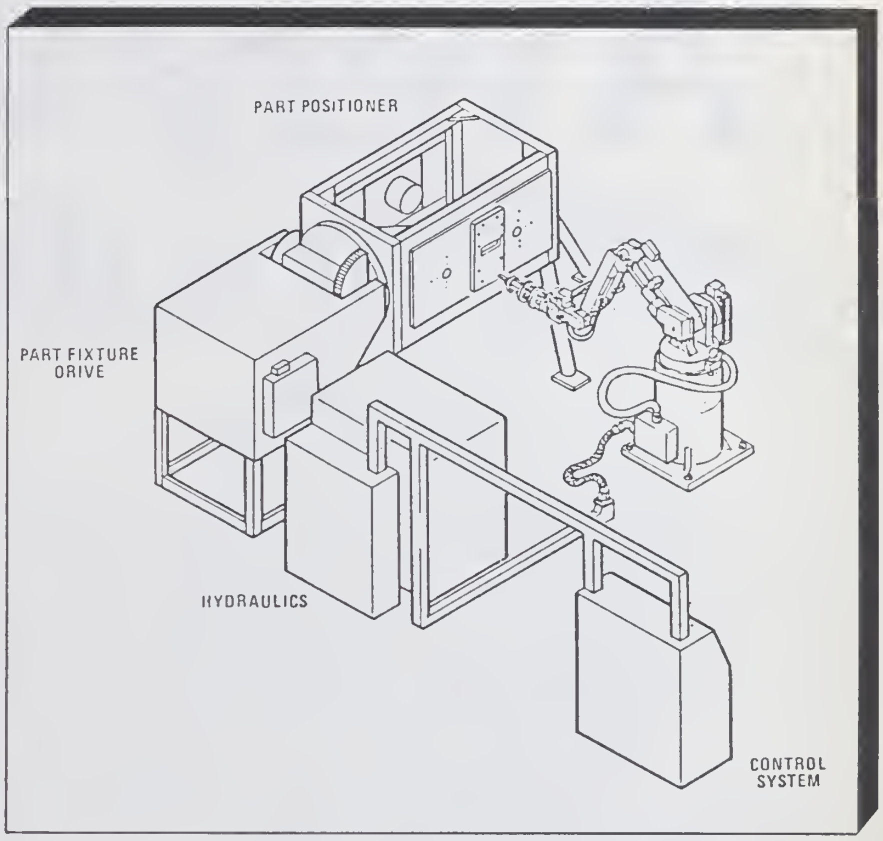


Figure 5. Robot Workstation Concept

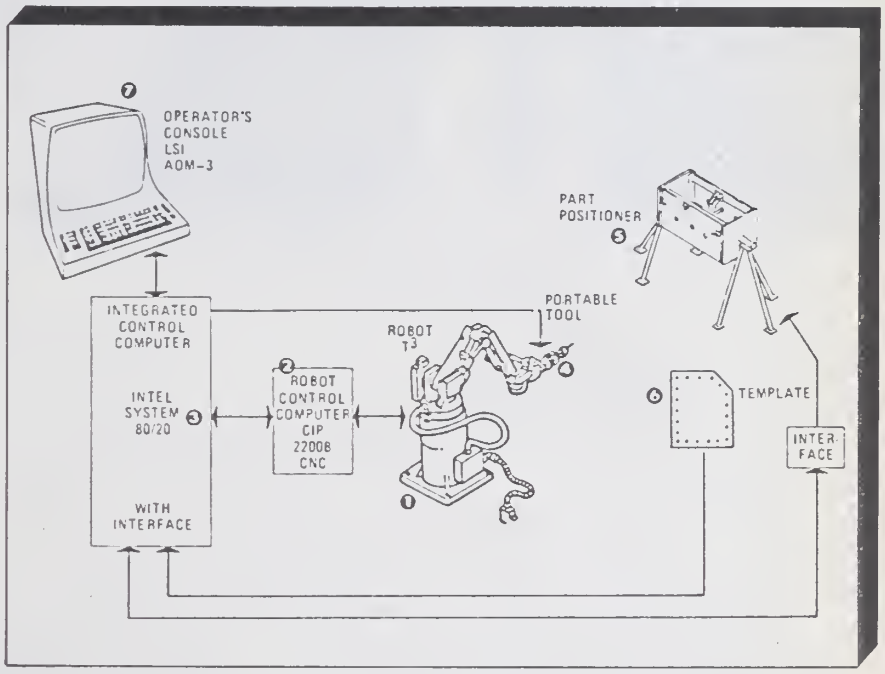


Figure 6. Task A Robotic Workstation

tion and demonstrate its use in an actual batch manufacturing environment.

3) To expand the workstation into a fabrication cell that demonstrates its use in a production environment. There are three major phases of this project.

Phase 1

During Phase 1, a coalition consisting of General Dynamics, SRI International, C.S. Draper Laboratories, Cincinnati Milacron, Inc., Unimation, Inc. and AMF Versatran, Inc. pooled their experience and specialized knowledge of robotics to assess current robotic technology. The results of this assessment are contained in a robotic application guide. It has been written to serve the needs of aerospace manufacturing engineers and contains relevant technical data pertaining to robot capabilities including repeatability and accuracy, tooling and tool interfaces, software and hardware specifications and sensor capability and adaptability.

The robotics guide was prepared following the format shown in Figure 4.

In Section I, definitions of robotics terms are included to orient the reader to the overall contents.

In Section II, concerning robot characterization, information is provided on robot types, potential uses, capabilities and limitations.

Section III, current technology, contains factual data, including illustrations, on available industrial robots and emphasizes operating characteristics.

Next in the guide, Section IV contains information concerning the effects of robotics applications on employee relations, industrial health and safety and compliance with regulation of the Occupational Safety and Health Administration.

Section V, applications information, illustrates lessons on the application/-implementation process as experienced over recent years in the manufacturing industry. This section defines robotic limitations and explains the necessity for certain tooling modifications. It also shows why a systems approach must be used to select a robot and define its applications.

In Section VI, historical examples of cost patterns are presented as well as a checklist and formulas for cost estimation.

In Section VII, sources of information are cataloged to guide users to specific application information.

In Section VIII, conclusions are drawn on the range of applications and the profitability of robotic installations.

This report is available for distribution to U.S. companies. It can be requested by writing to: AFWAL/MLTC, Wright-Patterson AFB, Ohio 45433

Also during Phase 1, the "best" configuration for a workstation for robotic drilling and routing of sheet metal panels was defined.

Phase 2

During the program's second phase, the robotic workstation defined in Phase 1 will be established and demonstrated for the drilling and routing of F-16 sheet metal interchangeable, replaceable fuselage panels.

With the assistance of the coalition, General Dynamics assembled, adapted, constructed and/or developed the system components selected in Phase 1 to configure a functional, production-ready workstation for drilling and routing aircraft sheet metal panels (Figure 5). General Dynamics has fully demonstrated the drilling and routing of this robotic workstation in the laboratory using a Cincinnati Milacron T^3 robot and its immediate predecessor, the Model 6 CH. The hardware and software components of the overall control architecture were assembled and integrated into the workstation configuration, and a great deal of effort went into establishing software for the functions of drilling and routing.

The robot control system was "taught" the coordinates in its work space and programmed to make the movements required for each operation. The control system was designed to accept sensor signals or programmed instructions for activating the drilling and routing tools used in machining operations. It could also recognize signals from safety sensors and cause the robot to execute appropriate programmed actions to eliminate the hazards. Interlock devices were also linked with the control system to ensure safety of personnel.

Hard tooling is used to locate the drill and to guide the router. General Dynamics designed the drill and rout heads with enough compliance to adjust to the repeatability limits of the equipment.

(Continued on In Depth/18)

INTERACTIVE USER REPORTS

"A very versatile computer."

Dean A. Banz, Manager, Information Services, Burr-Brown Research, Tucson, Arizona

Versatility.

"Burr-Brown develops, manufactures, and markets a broad line of high-performance electronic components and systems.

"We wanted a computer that could be used efficiently by many departments and realized that a batch system couldn't handle the job. We needed a very versatile computer. One that could bring large system capability to the different people who needed it.

"We chose the interactive DECSYSTEM-2040.

"Now we have 25 terminals at various locations—all doing different jobs, all at the same time. We run applications like Materials Requirement Planning, Customer Order Entry, Inventory Control, Product Design, Cost Accounting, Payroll, and Statistics. The 2040 handles all our requirements for both batch and interactive processing, and several different languages.

"The versatility of the DECSYSTEM-2040 has contributed greatly to the growth of our business."

Expandibility.

"We provide computer services to our Research Center for use in engineering and scientific analysis as well as information processing related to cancer and solar energy research.

"Because service bureau computer time became too expensive we decided to install our own in-house system, a DECSYSTEM-2040.

"We started out with eight terminals, but when we found out how productive the system was, we began expanding. Today, we have 45 terminals running simultaneously, including one in a vice president's home. We've even added cache memory without any software changes. And we still haven't reached the capacity of the system.

"By expanding the DECSYSTEM-2040, we've been able to lower our costs by 40-50% and at the same time substantially increase our services."

Michael Jaskowiak, Manager, Franklin Institute Computer Center, Philadelphia, Pennsylvania.

Productivity.

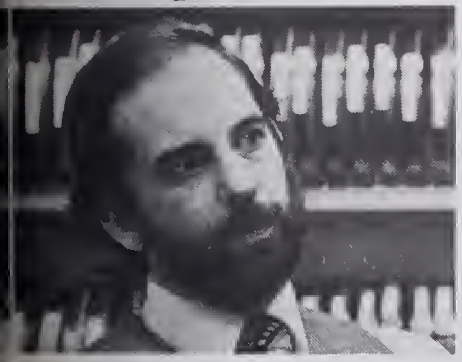
"The USRA was created by an act of Congress in 1973 to reorganize bankrupt railroads in the Northeast corridor.

"We were using service bureaus, but it became so expensive that we decided to get an in-house computer.

"We chose the DECSYSTEM-2060 because of its low cost, its interactive capabilities and its excellent implementation of APL. We also hoped that the interactive, user-oriented operating system would improve programmer productivity.

"Our productivity figures are impressive. Now we're able to develop and enhance software during prime time and run complex models overnight that would be too costly to run at service bureaus.

"With the DECSYSTEM-2060, we estimate our return on investment is five to one."



Bill Kelleher, Chief, Computer Facility, United States Railroad Association, Washington, D.C.

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(Continued from In Depth/15)

The robotic workstation (Figure 6) consists of a (1) Cincinnati T^3 robot, (2) a robot control computer, (3) a workstation control computer, (4) compliant tooling, (5) a work-positioning mechanism, (6) an adapted drill/rout template and (7) an operator's console. The workstation was assembled as a functional production unit in the General Dynamics Robotics Laboratory for an initial demonstration of the functional capability.

Six I/R fuselage panels were selected for drilling and routing in the robotic workstation by production personnel in the normal production sequence. The demonstration verified that production operations of this type can be carried out rapidly, economically and safely.

In the fall of 1979, General Dynamics began using this workstation on the shop floor to drill and rout potentially up to 150 different kinds of F-16 sheet metal panels.

Phase 3

During Phase 3 of the program, the robotic workstation will be expanded to include the functional capabilities of a work cell. Then the work cell will be demonstrated in a production environment, its performance will be analyzed, potential further enhancements will be identified and technical limitations will be defined.

The planned robotic cell will include all of the components from the workstation (T^3 robot, work positioner and compliant tools) plus a mass data storage system, an automatic tool-changing capability, an optical character recognition system for automatic part identification, a material-handling system and an automated work positioner. The entire work cell will operate under the direction of an executive control computer. This cell is projected to be operational on the shop floor this month.

Task B

Task B started with McDonnell Douglas in July 1978, and the basic effort will be completed in July. This project will produce the following:

- An off-line programming capability for industrial robots.
- A high-level robot programming language to provide a comprehensive, easy-to-use interface between the user and the robotics control system.
- A robot control hierarchy in which the control system is partitioned into different functional levels.
- Group-technology-based universal tools to accommodate as broad a spectrum of parts as is feasible.
- Vision system/functional sensors capable of identifying and providing orientation data as well as the necessary data for a robot to interact with the environment of the manufacturing cell.
- Data base links to provide well-defined, general interfaces for passing information between the robotics system and any user-defined data base.
- A demonstration of the advance robotics technology, in a laboratory environment, through the establishment of an automated manufacturing cell for drilling and riveting sheet metal subassemblies.

Early emphasis in the program centered around an initial nine-month planning phase during which McDonnell Douglas prepared three extremely detailed plans: a production integration plan, an off-line programming plan and a high-level robot programming language plan.

Production integration plan. The production integration plan was the basis for developing a fundamental architecture for the entire robotic system. The plan is the formulation of an approach for implementing the system and the assessment of problems involved in the configuration and integration of such a system into a production environment.

This plan outlined a total robotic system for aerospace batch manufacturing which will use a high-level programming language to program a computer-controlled industrial robot off-line.

Technological limitations and design deficiencies associated with current state-of-the-art hardware and software were considered in the plan. The existence and magnitude of robot inaccuracies outlined by the Task A contractor (General Dynamics) were confirmed by McDonnell Douglas and were accommodated in the system design.

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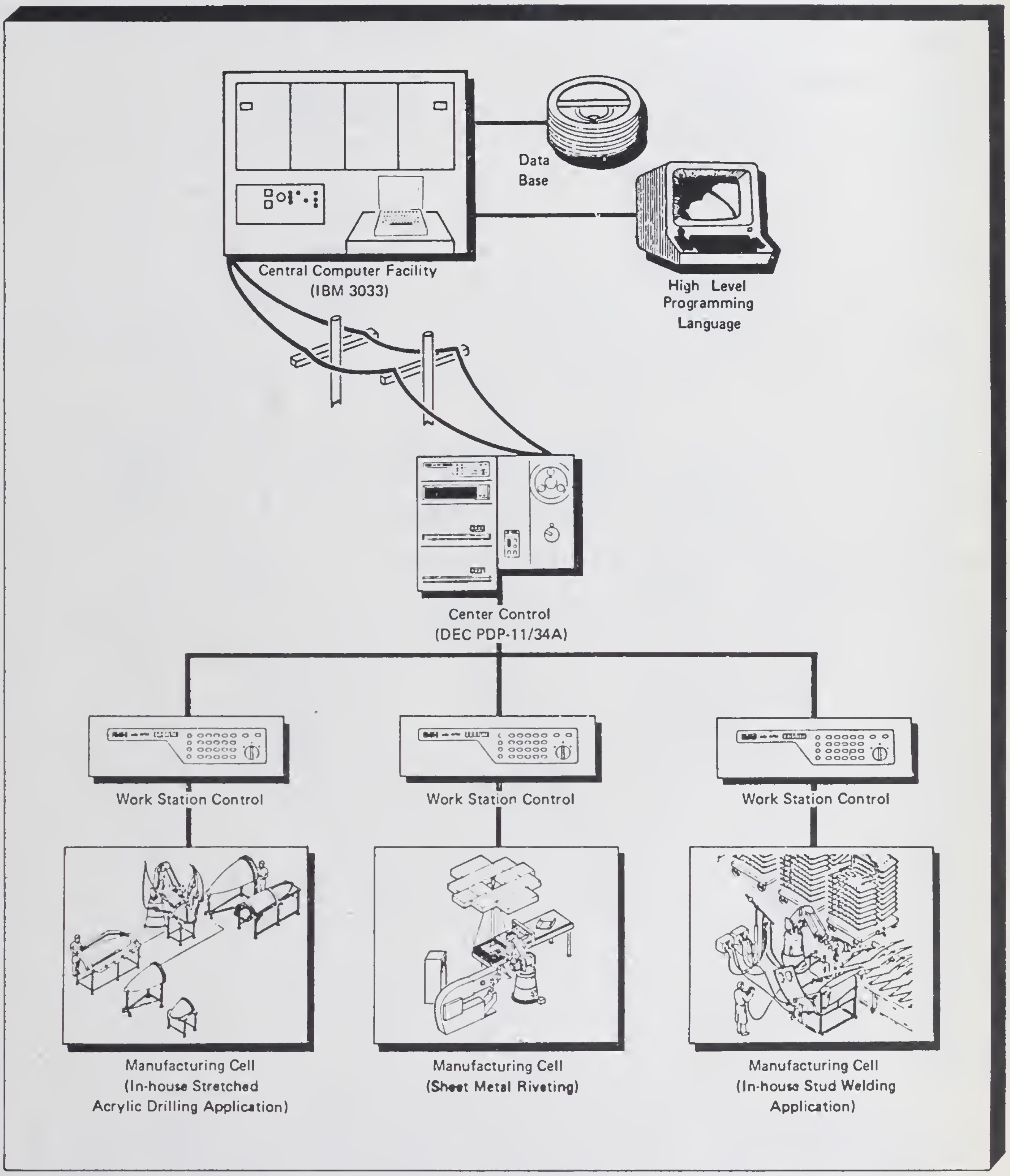
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Manufacturing Cell (Sheet Metal Riveting)
Manufacturing Cell (In-house Stud Welding Application)

Figure 7. System Structure

Computer simulation and modeling were used extensively throughout this design effort to define more clearly the operation of the system in its alternate configurations. The system was first defined by a descriptive model which was used to produce a Q-Gert network. This network model was used to simulate the proposed systems as the design evolved. Results of the simulation led to certain design considerations. Typical factors evaluated by simulation included:

- *Transmission errors.* The simulation model considered the probability of line errors occurring when transmitting data from the central computer facility to Center Control. The results indicated that even when the probability of such errors reached 50%, the impact on system operation was negligible. Therefore, any requirement for the design of special transmission media was eliminated.
- *Computational requirements.* Also examined were the computational capabilities of microprocessors to perform the orientation calculations. Simulation results indicated insignificant differences between the use of two different microprocessors. This software compatibility was the selection criterion for one of the systems.
- *Robot cycle time.* The simulation results also demonstrated that the robot cycle time was the dominating factor of the entire system; for example, as robot task time increased, the time for a typical subassembly to flow through the manufacturing cell increased proportionally.
- *System architecture.* The system's architecture is based on distributed levels of control, making it both general and adaptable to future enhancements. The impact of the system design on process planning, scheduling, inventory control, tool design and direct numerical control was considered. Rudimentary provisions for these processes, as well as many of the signals necessary for future automation, are included as part of the initial design.
- *System structure.* The McDonnell Douglas plan for the establishment of a generalized off-line programming capability was based on a top-down design and is depicted in Figure 7. A major design goal was to provide robot independence, since diverse application areas may dictate a variety of manipulator configurations. Robot independence will be achieved by converting the generic input data received from the central computer facility into commands for the stations of the manufacturing cell as a function of Center Control.

Robot program preparation will be performed in the central computer facility through the use of a high-level robot programming language. The output of this process will be robot-independent and will be stored in a data base. This data will be transmitted to Center Control, from which appropriate manufacturing cell instructions will be sent to Workstation Control upon request. In addition to facilitating robot independence, Center Control provides a point of expansion for accommodating multiple manufacturing cells.

Workstation Control has the task of coordinating all the activities of the stations within the manufacturing cell. This will be accomplished by monitoring the operation of manufacturing cell stations, processing the signals received and directing cell operation based on real-time conditions.

The manufacturing cell in the proposed system architecture includes the robot and all the associated tooling and equipment required to perform a manufacturing operation under the direction of Workstation Control.

Off-Line Programming. The current "teach" method of training robots is tedious, time-consuming (one to three weeks) for complex parts and error-prone. In addition, the robot is tied up for the length of time it is being taught. Thus, the robot will be programmed off-line for maximum efficiency.

High-level robot programming language. The purpose of the high-level robot programming language is to provide a comprehensive, easy-to-use interface between the manufacturing planner (user) and the robotics control system. The language provides an off-line method for specifying all the operations needed to accomplish the desired manufacturing process, without the use of "teach mode" to direct the robot.

The statement of work to McDonnell Douglas specified the following:

- The program shall be independent of an individual robot.
- The program shall have the ability to use APT to define location points in cutter location data format.
- Fortran Standard shall be used for implementation.
- National Bureau of Standards standards shall be applied for upward migration, portability and standard interfaces.
- The robot language shall be consistent with the Automatically Programmed Tools Language (APT) and integrable with Direct Numerical Control.

The selection of APT was motivated by the above requirements and several other factors:

- APT is familiar to aerospace users. This should increase user acceptance and decrease training requirements.
- APT is familiar to CAM systems programming support groups; this

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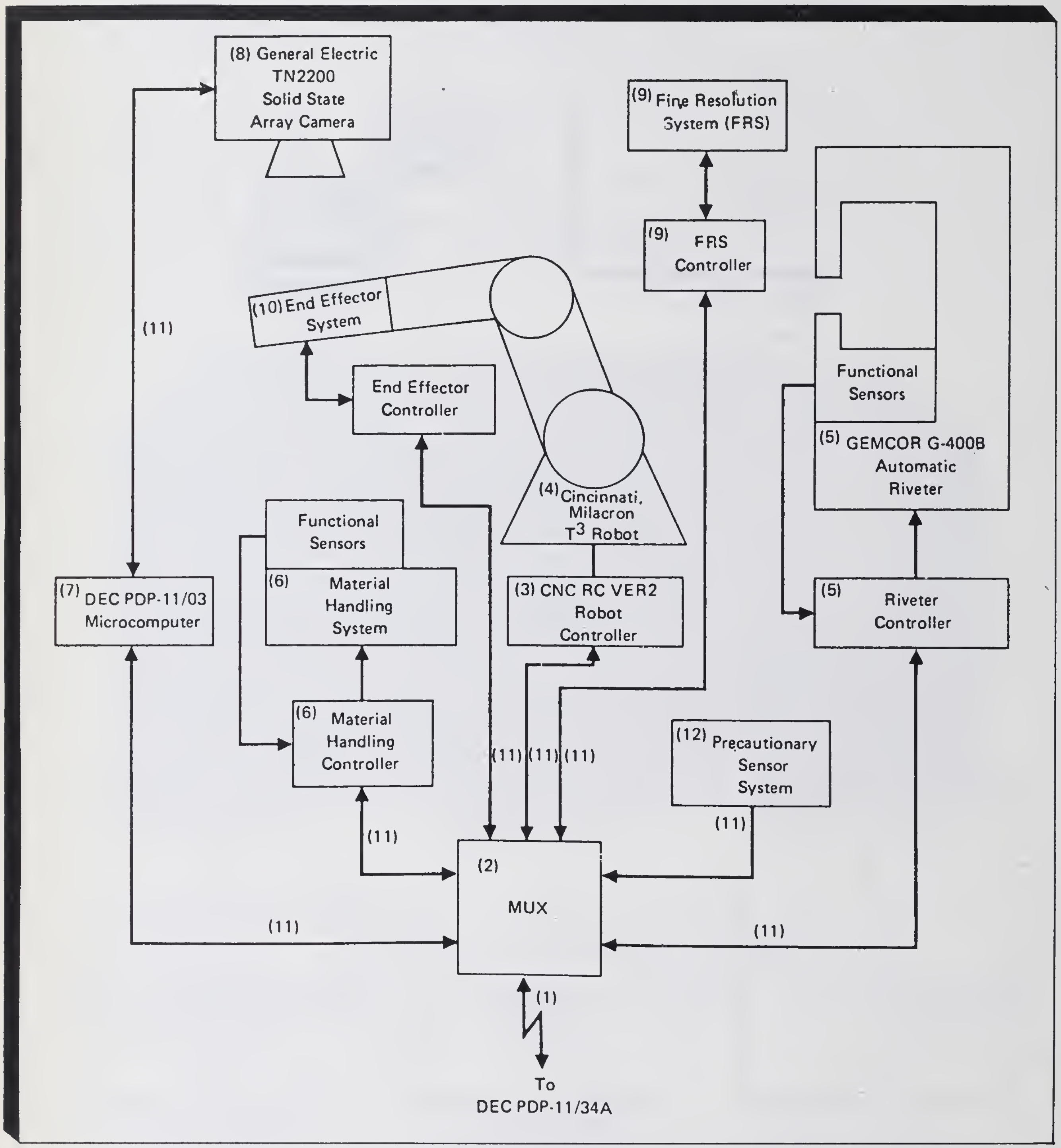


Figure 8. Manufacturing Cell Hardware Components

(Continued from In Depth/19)

may lower development and maintenance costs. Use of APT also avoids the need to maintain multiple-language processors.

- APT has maintained a certain amount of transportability and compatibility, both desirable attributes for a robot language.
- There has been a large investment in supporting systems surrounding APT, such as editors, terminal systems and data base. Robotics can also benefit from these systems.
- Finally, the capabilities added to APT for robotics — particularly the provisions for real-time feedback — may open up new opportunities in numerical control.

Language Design

APT contains many features that make it an excellent foundation for a robot programming language. The plan, therefore, is to extend APT's capabilities by adding language statements designed for the robotics environment. The language will address all the equipment in a manufacturing cell, not just the robot. Cutter location data will be the output from this expanded version of APT.

The system capabilities will be demonstrated in a cell that will locate and install rivets in aircraft panels. The cell components are shown in Figure 8.

Manufacturing

The manufacturing cell of McDonnell Douglas's proposed system architecture includes the robot and all associated tooling and equipment, which works with the robot under the direction of Workstation Control. The control of the individual components is based upon a distributed network — that is, the necessary intelligence to comprehend a high-level command is not centered in one computer, but spread throughout a series of microcomputers.

Workstation Control is linked to the manufacturing cell through a high-speed (1-MHz) glass fiber optic line (1) (see Figure 8). This transmission is received by an intelligent multiplexer, which directs the signals to the correct component. The multiplexer also receives signals from the components for transmission to Workstation Control.

The main function of the robot (4) is to manipulate and orient the workpieces within the cell. The robot is controlled by a CNC controller (3) which provides a transformation from the Euclidean coordinate system to the robot's joint coordinate system. The hole preparation and fastener installation will be accomplished through the use of an automatic riveter (5).

The subassemblies to be processed are delivered and removed from the manufacturing cell by the material-handling system (6). The material-handling system consists of a conveyor, the compliant rotary table and various sensors.

Once the part is on the compliant table, it is viewed by the vision subsystem, consisting of a solid-state camera (8) and a microcomputer (7). The vision subsystem is responsible for the determination of part orientation. To aid in the precise alignment of the part and to assure correct fastener installation, a fine resolution system (9) is used. This system also compensates for the inaccuracies of the robot.

An end-effector system (10) provides the robot with the ability to acquire workpieces. This system is the controller for the use of varied group technology-based end-effectors. All communication between the cell components and the multiplexer takes place over plastic fiber optic links (11) to reduce interference from the external environment.

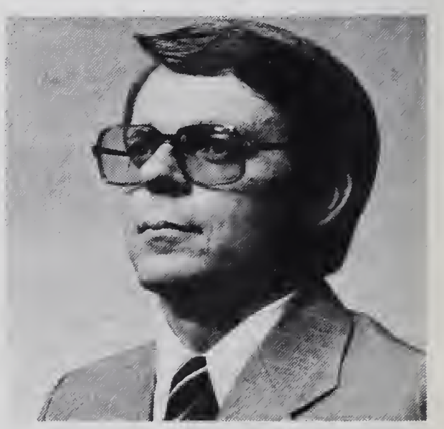
A separate precautionary sensor system (12) has been provided with a direct link to Workstation Control, to assure immediate response to safety violations within the cell.

The Air Force has given McDonnell Douglas approval to proceed with the project in accordance with the plans received. The actual demonstration of these concepts is expected in July.

Task C

This project by Lockheed—Georgia consists of a study effort to analyze and establish functional requirements for the use of robots in the assembly of aircraft sheet metal parts in a batch manufacturing mode. Task C builds upon the results of Tasks A and B and extends robotic technology into the assembly area.

Task C addresses the applicability of robotics research efforts and development needs into an assembly station which could be expandable to an assembly cell that should be operational by the mid-1980s.



Gerald C. Shumaker is manager of the Systems Group of the Computer Integrated Manufacturing Branch at the Air Force Materials Laboratory, Wright Patterson Air Force Base, Ohio.

Shumaker's group is responsible for the architecture, group technology, operations research and computer systems aspects of the Icam program.

Shumaker has 17 years of engineering experience with private industry and government. He holds bachelor's and master's degrees in mechanical engineering from Ohio State University.

Personal Computer Nets

Future Systems Seen Relying on VLSI

By Molly Upton
Special to CW

SAN FRANCISCO — "The computer systems of the future will consist of a network of personal computers and central resources with shared programs and data. Communication costs will remain relatively expensive, even as computation becomes inexpensive," according to Alvin M. Despain of the Computer Science Division at the University of California-Berkeley.

This and several other presentations at the IEEE Computer Society's recent conference (Compcon) revealed designers are busily concocting new systems architecture to take advantage of very large-scale integration (VLSI).

Despain's session on multiple computer systems focused primarily on a laboratory project called X-Tree, a multiple microcomputer system that starts with the assumption that memory, logic and switching functions will all reside on one chip.

Because a key limiting design factor will be the relatively low proportion of pins to gates on a chip — perhaps 100 pins for a million gates — the X-Tree system is designed to handle numerous functions within a chip. Rather than a number of specialized chips, one chip might have 64K bytes of memory, about 50,000 gates and a communications switch to route data between chips, Despain said.

The X-Tree system is perceived as a tightly coupled multiprocessor network with shared global memory. A tree design was selected because it provides extensibility and is fault tolerant. Moreover, performance does not deteriorate as much with additional nodes as it does with many other types of structures such as a bus, loop or ring, he said.

The X-Tree group is now building a seven-node system.

Message Switching

Carlo Sequin, also of Berkeley, described his work on message switching, which he said could apply to other types of systems as well as to X-Tree. All communication within the system is message-based.

Sequin's approach is "to provide communication and computation in parallel by separate dedicated hardware.

"Although eventually all necessary communication hardware may become an integral part of the single-chip computer itself, for the near future it may be advantageous to have separate building blocks for the communications system," he said.

"The total amount of circuitry required to build a complete communication switch is nontrivial and may rival the amount of logic hardware in the actual processor attached in this node. This simply confirms the often heard opinion that the real problem of the next decade is not computation, but communication."

The switching circuitry routes messages through various nodes to their destinations without disturbing the actual microcomputer at each node, Sequin said.

The switch consists of a fast-time multiplexed bus connecting up to seven first-in first-out (Fifo) buffers each and a dedicated routing controller. The buffers serve as queues for arriving and departing bytes and provide elasticity necessary to enhance throughput, he explained.

The routing controller is the nerve center of the switching node and protects the actual processor at each node from constant interruptions resulting from changes in status of a message channel. To prevent channels from clogging with long messages, some channels can be reserved for short messages, Sequin added.

Bus Capability

Sequin sees VLSI improving the capability of the time-multiplexed switching bus. Since this part "and all the communications ports will eventually be contained on a single chip, the bus will not be loaded down by the external parasitic capacitances and can thus operate at chip-internal speeds which can be an order of magnitude higher than external signals.

"It can then easily keep up with eight communication ports by serving them in a round-robin fashion," he explained.

There is a separate bus for control purposes, including updating translation and routing tables, and for determining which slots are free on a particular link, Sequin noted.

Private General-Purpose CPUs Predicted for Commercial Use

By Molly Upton
Special to CW

SAN FRANCISCO — When computer scientists decide they want their own private general-purpose machines with advanced capabilities such as sophisticated graphics and audio I/O, can similar commercial systems be far behind?

When one considers the "personal" systems described at the recent IEEE Computer Society's conference (Compcon), one realizes the blessings very large-scale integration (VLSI) may bring to the market.

Sessions on the next generation of personal scientific computing and microprocessor-based architectures indicated very capable, fast and versatile computers are in laboratories now, and work is proceeding to make such systems commercially available.

Most of the systems described will offer a full range of capabilities. They are also easily upgradable in single-station configurations and are capable of being hooked into large networks.

Several common features characterized the various efforts presented at Compcon. These include modular architecture, lots of microcode accessible to the user and wide bandwidths and separate buses and possibly processors to provide extensive graphics capabilities.

MIT's Laboratory for Computer Science "is preparing for the gradual and orderly transition from its current dependence on centralized multiuser time-shared machines to an eventual network of 'personal' computers providing for virtually all of the laboratory's computation needs," according to MIT's Steve Ward.

Howard Wactlar, of Carnegie Mellon University's (CMU) computer science department, said CMU wants to work with a manufacturer to develop a commercially available system with features such as one million instructions per second (MIPS) and 1M byte of memory with high-resolution display and audio I/O.

"We are entering a new world of versatile personal computers, as different from the

(Continued on Page 72)

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Wholesaler Ties in Audio Response

PENNSAUKEN, N.J. — Coupling audio response units to its computer system has allowed Baxter Warehouse Corp. here to develop what it thinks is a unique order entry system.

The audio response units are connected to two Burroughs Corp. B1700s here, which in turn are linked to a B1815 recently installed at the firm's Union, N.J., warehouse.

The three systems, valued at approximately $750,000, coupled with the audio response units, give Baxter one of the fastest and most sophisticated order entry systems for wholesale distribution in the nation, according to Jack Balkus, corporate director of management information systems.

Baxter decided to purchase the B1815 for its Union facility because of its attractive price/performance ratio and the software compatibility with the B1700s, Balkus said. "By installing the B1815 in Union, we were able to bring the B1700 it replaced to our Pennsauken site for backup purposes and to facilitate faster order entry," he added.

"In New Jersey, the price of liquor is regulated by the state. Therefore, success in this market is based on a distributor's ability to offer customers fast service. Placing the B1700s in our Pennsauken warehouse allowed us to fill orders overnight."

Sales Makeup

Baxter Warehouse has 180 field salesmen and four sales organizations: Majestic Wine & Spirits, Inc., Joseph H. Reinfeld, Inc., Flagstaff Liquor Co. and the Banner Liquor Co.

Salesmen in the field call on more than 12,000 customers licensed by the state of New Jersey, including restaurants, bars and retail stores. The salesmen use Touch-Tone telephones to enter their orders over special toll-free telephone lines connected to two audio response units. These units, with 12 telephone lines each, are on-line to the computers.

"The audio response units, which we installed in July, are now our main method of order entry," Balkus said. "The salesmen receive verbal confirmation of their orders from the B1700s through the response units, which have a 120-word recorded vocabulary," Balkus said. "An invoice, which averages eight order lines, is then ready to accompany a shipment from either our Union or Pennsauken warehouse."

Balkus said the B1815 at the Union facility, which communicates with the B1700s in Pennsauken, prints invoices and shipping information and updates files. Although the B1700s control all data bases and files, the B1815 has 130M bytes of disk pack storage and 128K bytes of main memory.

The B1700 systems in Pennsauken each have 256K bytes of memory, 130M bytes of disk pack storage and 9.2M bytes of disk cartridge storage. These systems are on-line to 12 TD 830 CRT terminals in Pennsauken and 18 TD 830s in Union, which are used for on-line programming and to enter orders directly from customers.

A peripheral switcher is used to switch peripherals between the B1700 processors to guarantee maximum order entry uptime. Balkus noted, however, that one of the B1700s is primarily used for backup.

Book Discusses Microfilm Use

ROCHESTER, N.Y. — "Microimage Processing and Transaction Retrieval for the Financial Industry" is an 18-page booklet free from the Eastman Kodak Co. that discusses the ways the banking industry can integrate microfilm into operations.

The booklet discusses transit item flow, direct deposit accounting item flow and other banking applications.

The booklet, Kodak publication No. A-1900, is available through local Kodak representatives or from Department DP-9017, Business Systems Markets Division, Eastman Kodak Co., 343 State St., Rochester, N.Y. 14650.

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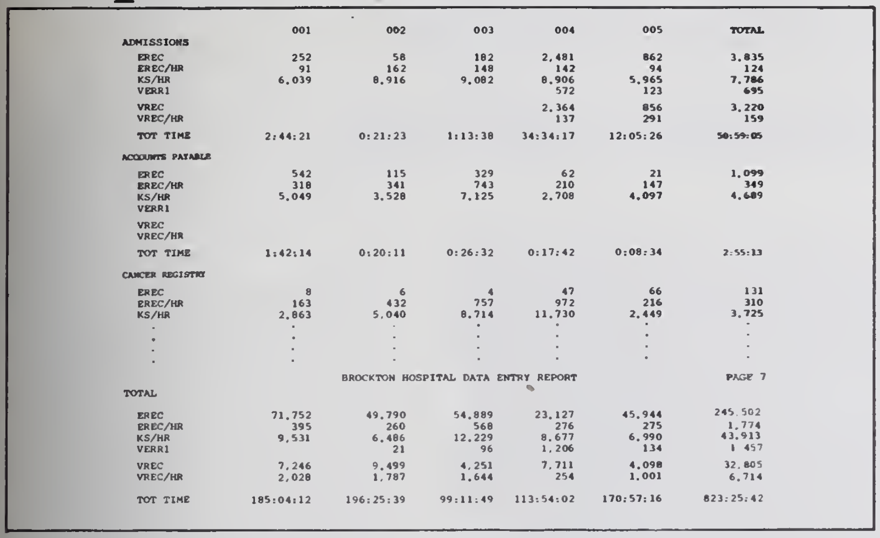

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  VERR1                                              572        123           695
  VREC                                             2,364        856         3,220
  VREC/HR                                            137        291           159
  TOT TIME      2:44:21    0:21:23    1:13:38   34:34:17   12:05:26      50:59:05
ACCOUNTS PAYABLE
  EREC              542        115        329         62         21         1,099
  EREC/HR           318        341        743        210        147           349
  KS/HR           5,049      3,528      7,125      2,708      4,097         4,689
  VERR1
  VREC
  VREC/HR
  TOT TIME      1:42:14    0:20:11    0:26:32    0:17:42    0:08:34       2:55:13
CANCER REGISTRY
  EREC                8          6          4         47         66           131
  EREC/HR           163        432        757        972        216           310
  KS/HR           2,863      5,040      8,714     11,730      2,449         3,725
   .                 .          .          .          .          .             .
   .                 .          .          .          .          .             .
   .                 .          .          .          .          .             .
   .                 .          .          .          .          .             .
                        BROCKTON HOSPITAL DATA ENTRY REPORT                PAGE 7
TOTAL
  EREC           71,752     49,790     54,889     23,127     45,944       245,502
  EREC/HR           395        260        568        276        275         1,774
  KS/HR           9,531      6,486     12,229      8,677      6,990        43,913
  VERR1                         21         96      1,206        134         1 457
  VREC            7,246      9,499      4,251      7,711      4,098        32,805
  VREC/HR         2,028      1,787      1,644        254      1,001         6,714
  TOT TIME    185:04:12  196:25:39   99:11:49  113:54:02  170:57:16     823:25:42
```

Productivity Report for Hospital's Data Entry

By Stephen L. Priest

Special to CW

BROCKTON, Mass. — Brockton Hospital here has developed an ongoing data entry monitoring system that provides management with detail and overview statistics of the data entry operation.

The 322-bed nonprofit community hospital has a key-to-disk data entry system based on a Four-Phase Systems, Inc. IV/70 computer with 72K bytes of memory and an 8270 10M-byte disk drive.

The operating software provides for the capture of operator statistics and is similar to systems provided by other key-to-disk vendors.

Management wanted a report that could readily be used by the I/O supervisor and the DP manager on both a weekly and monthly basis. In response, the Brockton Hospital programming staff has designed a productivity report that prints out the statistics available in the system in a format that allows table comparison of data entry operators, applications and departmental statistics.

Report Format

The Hospital's data entry report is shown in the figure. Each operator is assigned a unique identifying number between 001 and 005 (the system is capable of handling up to 10 operators).

The left-hand column of the report identifies each application or job within the system, such as accounts payable and cancer registry. EREC represents the number of entry records the operator has made for the application during the given time period.

EREC/HR represents the operator's records per hour for the application and KS/HR represents the operator's keystrokes per hour. VERR1 represents the number of corrections (errors) made when verifying that operator's work for a given number of records (VREC).

VREC/HR is the number of records verified per hour by the given operator. TOT TIME represents the total time the operator spent on the system during the given time period.

As can be seen from the figure, the admissions application can be easily monitored for operators 001 through 005. In this case, operator 002 keys at the rate of 162 record/hour, where operator 001 does the same type of work at 91 record/hour.

At the far right is the total time spent on the particular application as well as the explained detail for that application. The last page of the report gives a complete summary for both operator and department for the given time period.

Also identified is the total number of records entered for the department as well as the time spent on the records and other appropriate information as shown.

Available Hours

Available weekly operator hours for the department are calculated as follows:

AVAILABLE WEEKLY
HOURS = S − (V+I+H+P+C)

S = Weekly scheduled hours.

V = Vacation hours taken.

I = Sick hours taken.

H = Holiday hours taken.

P = Half-hour personal time per day per operator.

C = Half-hour miscellaneous time per day per operator. This average time is based on a time study taken of non entry times. As an example, an incorrect control count may be

(Continued on Page 74)

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Private Systems for Commercial Users Predicted

(Continued from Page 69)

world of time-sharing as that world was from batch,'' he stated.

Dorado System

Xerox Corp.'s Palo Alto, Calif., research center — home of Ethernet [CW, Dec. 17] and Alta — has developed and built the Dorado, which Gene McDaniel said is anywhere from three to 50 times faster than the Alta. (The disk is only three times as fast; the processor itself is reportedly much faster). Alta was an earlier attempt to satisfy computational needs.

Dorado is designed to handle four high-level languages at once as well as high-bandwidth I/O devices such as color or gray-scale video displays, McDaniel said.

The Dorado's architecture can be expanded to have up to 28 bits of virtual address, 4M words of 16-bit storage and up to 16K bytes of cache memory. Currently it has 1M words of storage, 4K bytes of cache, 22 bits of virtual address and 640M bit/sec storage bandwidth, he explained. The machine is heavily pipelined with an instruction fetch unit that fetches and processes operating codes in parallel with processor execution.

But the Dorado took a long time to design, and much of the time since work started in 1976 was spent developing automated design tools, he indicated. Four Dorados are operational now, and Xerox plans to build another 20 or so for internal use.

One of the design parameters for the Carnegie Mellon system is that it be good at office automation tasks as well as scientific computing. ''Our community spends about 8% of connect time on tasks such as reading mail and generating documents,'' he said.

The design for the CMU project, called the Scientific Personal Integrated Computing Environment (Spice), also has a high bandwidth, about 10M bit/sec, a control store of at least 16K microinstructions, a minimum of 1M byte of main memory, a 32-bit address space and performance of 1M macroinstruction/sec.

The bit-mapped, high-resolution display is 1K by 1K pixels or points with keyboard and pointing devices as well as audio input and output. The cost is targeted at about $10,000 in the mid-1980s.

MIT Approach

MIT is taking the building-block approach and expects that, as need occurs, users can go to a supply room and check out additional memory, buses or graphics processors and plug these into their systems' backplanes, Ward stated.

To handle graphics, for instance, there can be a dedicated processor and bus, called Rho, which has two independent Nubus interfaces ''capable of simultaneous transactions on separate buses,'' Ward explained.

Some of the Nu basics include support for 32-bit words, 16-bit halfwords and an 8-bit byte; 32-bit byte addressing; a 32-bit data path with byte parity; and arbitration to allow more than one CPU.

Perq System

Last but not least is the system called Perquisite or Perq, that is being brought to market by Three Rivers Computer Corp. It was designed as a single-station device with sufficient power for engineers and office workers, according to Brian Rosen.

The system is high-level language — the Pascal intermediate code (P code) and has no assembler. It has a 768 by 1,024 raster scanned, bit-mapped graphic display with a touch-table pointing device.

Perq uses an Ethernet-like local network, with cable TV cable and plugs, thus making local loops very inexpensive, he added. The Perq system does not have a collision-detecting mechanism like Ethernet, but merely a collision-avoidance algorithm.

Three Rivers intends to have Perq ready to market by summer with a price tag less than $20,000.

Upton is editor of ''EDP Industry Report,'' an International Data Corp. publication.

X-Tree Software Detailed at Meet

SAN FRANCISCO — A system is not a system without software, so two presentations on the University of California-Berkeley's X-Tree microcomputer system described work on an operating system and an instruction set.

David Ditzel of Berkeley and Bell Laboratories told Compcon attendees here the X-Code instruction set was designed to allow hardware structures to support high-level languages and operating systems directly.

X-Code's creation combined studies of very large-scale integration (VLSI) structures, programming language usage, compiler technology and operating systems issues, he said.

Timothy David McCreery of Berkeley and also Badger Meter, described work on the bottom layer of the X-Tree operating system (XOS), which is capability-based. Quoting R.S. Fabry's description, McCreery said ''the idea is that a capability is a special kind of address for an object, that these addresses can be created only by the system and that, in order to use any object, one must address it via one of these addresses.''

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"We switched to NCR," says Joseph A. Dee of Brooks Camera, Inc.

Joseph A. Dee (left) is president and chairman of Brooks Cameras, Inc. in San Francisco. Jim Sweeney is his NCR Account Manager.

DEE:

Brooks Cameras is the largest photographic dealer in Northern California. And we're growing fast. We just outgrew the processing center that had been doing our computer work. We needed faster turn-around. And we wanted to establish our own priorities.

NCR's SWEENEY:

So you went to your own NCR system.

DEE:

Yes, but not directly. First, we selected a competing vendor's newly announced system. But as we started to plan, we began to see problems ahead. No tape drive. Perhaps no COBOL. Perhaps no match-up with our sales terminals. And all we could get from the supplier were vague assurances that the problems would somehow disappear. So we switched to NCR. Very fortunately, as it turned out, because our NCR system is up and running. While the other vendor is still not delivering the other system.

NCR's SWEENEY:

We are not only delivering, our operating software is fully tested.

DEE:

We had a shirtsleeve session with the NCR software people that was refreshing. They told us exactly where they stood. What we could expect and when. And that's the way it's turning out. They gave us the hard answers.

NCR's SWEENEY:

You liked Migration Path Engineering, too.

DEE:

Our requirements are too unique for us to expect off-the-shelf application software from any supplier. We have every kind of sales transaction. We accept all the regular charge cards as well as our own. We have rentals, repairs and layaways. And our own special promotions. So once we made the investment in our own specialized programs, we wanted to protect it. Even when our growth forces us to move to a larger system. With Migration Path Engineering, NCR can give us that protection.

NCR's SWEENEY:

And finally, you wanted one supplier who would assume responsibility for the entire system from A to Z — including the terminals.

DEE:

You're absolutely right, Jim.

In the NCR office nearest you, there is an account manager like Jim Sweeney who knows both NCR systems and your industry. To learn more about what an NCR system can do for you, phone him at your local office. Or write to EDP Systems, NCR Corporation, Box 606, Dayton, Ohio 45401.

Visit NCR at Interface 80, Booth 620.

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Reports Produce Clearer View of Data Entry

(Continued from Page 71)

supplied by a user and the operator must spend time locating and correcting the error.

The report provides the number of actual hours spent for all jobs. That number divided by the number of available hours provides a measure of data entry productivity.

Productivity can also be calculated for the month as well as for individual operators. If one uses scheduled vacation/holiday/average sick hours, then excess hours can be located for upcoming weeks and months.

Data entry operators are required to rotate among all jobs in the department. This provides backup in case of vacation, sickness or terminations. A quick review of the data entry report by the supervisor determines whether this policy is indeed being followed by all operators.

Another policy of the department is that certain jobs have to be verified. At rush times, the verification is often forgotten and eventually the requirement to verify a job is lost; this report allows the data entry supervisor to determine if the jobs are being verified.

As one of its important functions, the report reveals to the supervisor where errors are occurring in the data entry work load. Errors can be analyzed in relation to applications as well as to the people who are making the errors.

If it is obvious that a given application has an unacceptable number of errors for all operators, then possibly the equipment can be programmed to catch the errors.

The report also indicates if only one operator is causing an unacceptable number of errors. If this is the case, the supervisor may closely monitor this person's work load and entry procedures and work with the operator to reduce the cause of the errors.

The report can later be used to monitor the effect of the training. Such monitoring can be used for new personnel or present personnel on new jobs.

View of Cyclic Load

The weekly report is graphed for the department's total time as well as the number of records (EREC) for the week. This allows detection of high- and low-volume weeks or cycles.

This view of the cyclic work load has allowed us to schedule additional jobs during low periods and nearly eliminate overtime.

For example, a new job recently added to the work load required four hours once a month. The weekly volume graph allowed the scheduling of four hours during a low period without requiring additional people, equipment or overtime.

An essential part of the report is its ability to monitor the effect of changes. For example, a form may be redesigned in hopes of increasing record throughput.

The operator REC/HR rate is viewed before the change. After the operator has become familiar with the revised form, the REC/HR is again reviewed and a determination is made if the redesigned form actually affected record throughput.

This ability to monitor the effect of changes becomes more important as the hospital attempts to curtail spiraling costs. The hospital's experience with man-hour savings located in data entry routines justifies efforts to reprogram existing applications.

In summary, Brockton Hospital has utilized a data entry report to effectively monitor record throughput in the data entry area. Generated automatically as a by-product of routine production, the report is proving invaluable in monitoring work load and scheduling future applications.

Stephen L. Priest is director of information systems at Brockton Hospital.

AUTOMATED HOSPITAL INFORMATION SYSTEMS (AHIS) WORKBOOK

The University of Southern California Center for Health Services Research is currently working on a federally funded project to develop a workbook which will assist hospital decision-makers address the issues of AHIS needs assessment, cost and benefit analysis, selection, acquisition and management. In addition, it will contain descriptions of available systems.

Organizations and vendors which are now marketing Automated Hospital Information Systems and/or have relevant experience in system implementation are requested to contact:

Mr. James K. Childerston, Ctr. for Health Services Res., USC School of Medicine, Parkview Medical Bldg., Room A-202, 2025 Zonal Avenue, Los Angeles, CA 90033. (213) 226-2384.

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132 columns    underline       8 function keys    row & col cntr     half & full dplx
132 COLUMNS                    8 FUNCTION KEYS                       HALF & FULL DPLX
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               dual intensity                       menu set-up
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status line    dual intensity   cursor ctrl         menu set-up    vt-100 option
STATUS LINE                     CURSOR CTRL                        VT-100 OPTION
status line     underline       cursor ctrl       row & col cntr   vt-100 option
STATUS LINE     UNDERLINE       CURSOR CTRL       ROW & COL CNTR   VT-100 OPTION
                underline                         row & col cntr
132 COLUMNS     UNDERLINE      8 FUNCTION KEYS    ROW & COL CNTR     HALF & FULL DPLX
132 columns     underline      8 function keys    row & col cntr     half & full dplx
132 COLUMNS                    8 FUNCTION KEYS                       HALF & FULL DPLX
132 columns     blink          8 function keys    current loop       half & full dplx
132 COLUMNS     BLINK          8 FUNCTION KEYS    CURRENT LOOP       HALF & FULL DPLX
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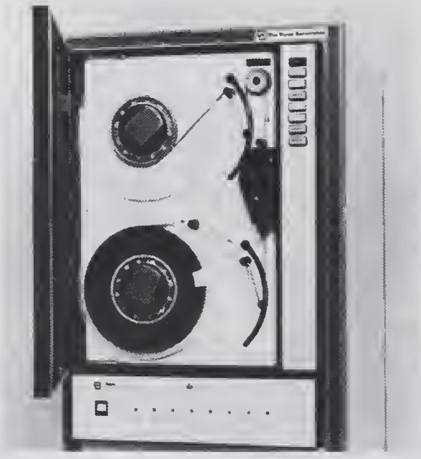
Magnetic Tape System Passes 100,000 Byte/Sec

SAN DIEGO — Dylon.Corp. has unveiled the Model 2101 GPIB (IEEE-488) magnetic tape system.

The system features data transfer rates in excess of 100,000 byte/sec, dual buffers up to about 16K bytes, IBM and Ansi-compatible tapes, more than 30M bytes of data storage with a single drive and automatic conversion of Ascii to and from Ebcdic tape formats.

A dedicated Z80A microprocessor manages bus interface, formatter and tape transport functions.

Prices for the Model 2101 start at $7,995. OEM rates are available. Dylon is at 3670 Ruffin Road, San Diego, Calif. 92123.



Dylon Model 2101

Nucon 80 Slated in April

MINNEAPOLIS — The Tenth Annual NCR Users Conference (Nucon 80) will be held here April 20-23, sponsored by the Federation of NCR User Groups.

With the theme "From the Progress of the '70s to the Challenge of the '80s," the conference will feature an expanded program of eight concurrent tracks with 92 individual sessions.

Special emphasis will be placed on the general features as well as more technical aspects of the VRX, Imos and IRX operating systems, transaction processors and data base management systems.

Industry-Specific Sessions

There will also be vocationally oriented sessions in such areas as finance, medicine, manufacturing, retail and education. Also available will be a three-hour seminar on "Stress and Management" that will demonstrate techniques of relaxation.

The registration fee for the conference is $155 before April 1, $135 from April 1-20 and $190 at the door.

Registration materials are available from Dennis Caldwell, Program Chairman, 152 S. 54 St., Tacoma, Wash. 98408.

ICL Establishes U.S. Service Arm

EAST BRUNSWICK, N.J. — International Computers Ltd. (ICL), the British vendor, has announced the formation of a National Customer Service Division.

The division will be responsible for the installation and maintenance of ICL computers, data terminals and peripheral systems in the U.S.

Headquartered here, the division will be the first of a number of service centers ICL plans to open in major U.S. metropolitan areas nationwide, a company spokesman said.

Fire Extinguishers Contain Halon 1211

MARINETTE, Wisc. — The Ansul Co. has brought out its Halon 1211 electrically nonconductive fire suppressant gas in four lightweight Sentry fire extinguishers.

The stored-pressure portable units come in 2.5-, 5-, 9-, and 14-lb models and cost $47.90, $76.15, $122.00 and $162.75, respectively.

Ansul has a distributor network nationwide listed in the Yellow Pages, a company spokesman said.

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Martin E. Hellman

TIME Magazine: "The code breakers may finally have met their match. As a result of recent work by Stanford University scientists, ciphers that are for all practical purposes unbreakable can be produced easily. Says **Scientific American** Mathematics Columnist Martin Gardner: 'The breakthrough bids fair to revolutionize the entire field of secret communication' . . . Hellman overcame this fundamental obstacle with a dazzlingly simple yet ingenious scheme." Prof. Hellman has also played a leading role in suggesting improvements to the National Data Encryption Standard (DES).

Topics

Basic Concepts • Commercial Applications
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• Vulnerability of Communications
• Privacy Legislation

Cryptographic Systems • IBM Systems and the National Data Encryption Standard (DES)
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• Shannon Theory Approach

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• EFTS • Electronic Mail
• Telecommunications & File Encryption

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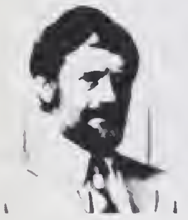

Washington, DC June 23-25 • Los Angeles, CA July 14-16 • Palo Alto, CA August 18-20

Prof. E. J. Weldon, Jr. is known internationally as the co-author of two authoritative yet readable books: Peterson and Weldon's second edition of the classic text **Error-Correcting Codes** and Lucky, Salz and Weldon's oft referenced **Principles of Data Communications.** He has that rare gift for explaining the extremely complex in plain, everyday language. "Dr. Weldon was able to explain the intricacies of coding in clear, understandable terms. He's truly an outstanding lecturer." **Jerry Stockton, NAVSEEACTPAC.** "Prof. Weldon's knowledge of hardware and microcomputers made his lectures on coding extremely useful to me." **Neal Glover, Storage Technology Corp.**

Topics

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3. Error Correction & Detection for Random & Burst Errors
4. Application to Memories
5. Polynomial Algebra
6. Cyclic Codes
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9. Byte Oriented Codes
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Special to CW

DALLAS — Increased inventory control and easy access to production information are just two benefits of an on-line minicomputer system recently installed here at one of the nation's leading paper converting companies.

With the system, a Hewlett-Packard Co. HP 3000, executives at Southwest Tablet can check finished goods and raw materials inventories using on-line CRT terminals. They can also see exactly what materials are on hand, on order and in the factory and can compare month and year-to-date figures with those from the year before, Jim Wilkinson, the firm's DP manager, stated.

In addition, the machine keeps track of quantities produced and the time and labor involved in each manufacturing job. The CPU combines this information with standard bills of materials and labor costs to produce a series of reports that help schedule work loads and chart financial margins.

Punched-Card Bottleneck

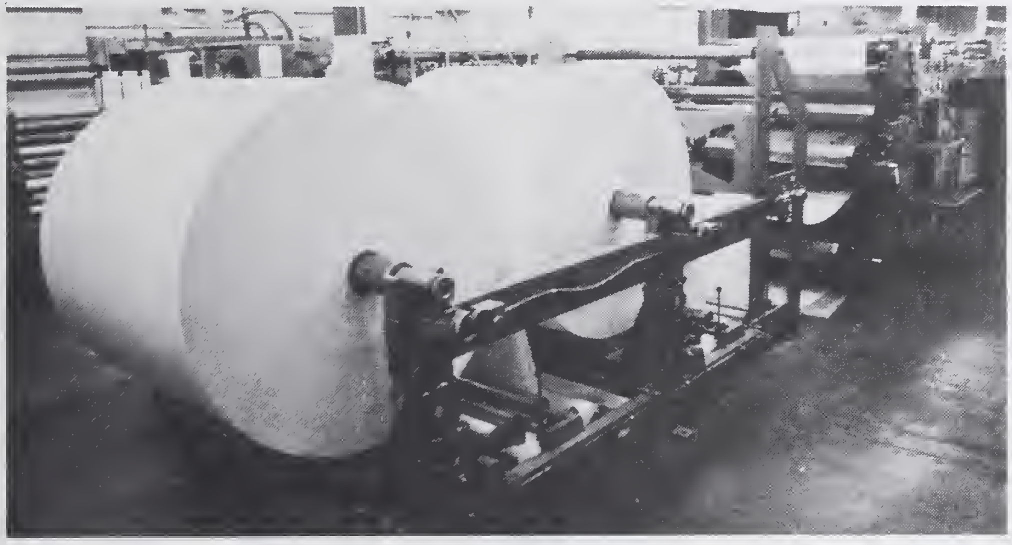
Previously, this type of information was either not available or 48 hours out of date because the jobs were run on a batch processing basis, input with punched cards, Wilkinson said.

"One of the major factors in the time taken to process data under the old system was the bottleneck caused by the punched card input," Wilkinson explained. "Ultimately, the speed and accuracy of the entire system depended on two keypunch operators.

"At first, with only a few simple applications, there was no problem, but as the number grew in size and complexity it took longer to get the data input. There were also some problems with accuracy.

"In the paper converting business, profit margins are low and raw paper and board usually make up more than 50% of the cost of a product," Wilkinson continued. "As a result, accurate purchasing and the efficient use of production facilities must be primary considerations if the business is to be profitable."

S.W. Tablet took a long hard look at the computer market over a 12-month period before finally selecting a new system. Eventually, it settled on an HP 3000 system with a main memory of 192K bytes, matched to a 50M byte disk drive, a 1,600 bit/in. tape drive, a 300 line/min printer, a CRT system console and four more CRTs. All this peripheral hardware was also manufactured by HP.



Some of the giant rolls of paper on the manufacturing floor at S.W. Tablet, which makes a variety of products from a single raw material.

Under the new system, responsibility for data entry has been placed in the hands of those who generate the data, Wilkinson noted. Sales service and purchasing offices all have their own CRTs, as well as the ac-

(Continued on Page 80)

Winchester Disk Drives Offer Protective Assembly Module

SUNNYVALE, Calif. — Ball Computer Products, Inc. has introduced two 14-in. Winchester disk drives that feature a sealed head/disk assembly module to protect against external contamination and offer capacities of 90M bytes and more than 158M bytes.

The Centennial Series BFM-90 and BFM-160 both contain a rigid deckplate, spindle, carriage assembly, three or four 14-in. disks, read/write heads and a servo head, all sealed in a dust-proof module. The single-module concept not only protects against dirt, but also eliminates interchangeability or misalignment problems that might lead to mistracking, a Ball spokesman claimed.

Four head configurations are used in the drives. Two data heads read and write to the top disk, and up to three double-headed assemblies each read and write to the bottom surface of one disk and the top surface of another.

The BFM-90 and -160 electronic components are carried on five printed circuit boards, partitioned into a power supply, servo, digital control, interface and read and write control.

The drives offer variable sector formatting that matches a variety of operating systems and data formats and are storage module disk (SMD)-compatible to comply with system software.

Other features include SMD-compatible early/late strobe control, offset positioning and rotational position sensing, which allows the user to command the drive to interrupt the system when a specified sector is reached, the spokesman said. Both disk models record at 6,486 bit/in. and have 20,160 bytes per track and 1,122 tracks per surface.

The BFM-90 and -160 cost $6,000 and $7,500 each, respectively. Additional information can be obtained from Ball at 860 E. Arques Ave., Sunnyvale, Calif. 94086.

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For Small Business Systems

Subsystem Protects Disk Data

BOSTON — Computer Service Systems Network, Inc. (CSSN) has introduced a backup subsystem for small business computers that provides a means of protecting disk-stored data.

The Backup subsystem includes a Z80A/S-100-compatible interface board, a Data Electronics, Inc. cartridge tape drive and a CP/M-compatible software utility that features file-by-file SAVE and RESTORE commands, a spokesman stated.

The magnetic tape cartridge has a capacity of 13.4M bytes and is said to be suited for Winchester-type disk drives.

The main feature of the Backup unit is its ability to restore just those disk pack files that were lost or destroyed and not the entire disk. Earlier bit-stream backup devices saved and restored entire disks, meaning that an error in one file could only be corrected by replacing all files on that disk, thus losing all work since the last backup.

Statistics from large timesharing operations indicate that most disk errors are operator-induced, involving individual files rather than a whole disk, the spokesman said.

The subsystem costs $2,995. OEM discounts are available from the company at 120 Boylston St., Fourth Floor, Boston, Mass. 02116.

HP 1000 Users to Meet

SAN JOSE, Calif. — The Hewlett-Packard Co. 1000 International Users Group will hold its first annual meeting Aug. 25-27 in San Jose, Calif.

The theme of the three-day conference, "Let's Get Started," is intended to stimulate communications among HP 1000 users and to survey the varied uses of HP software and hardware in the field, a spokesman said.

The group is currently inviting users to submit papers to the forum on such topics as computational applications, data communications, and instrumentation.

Additional information on the meeting and paper submissions can be obtained from Glen A. Mortensen, Intermountain Technologies, Inc., P.O. Box 1604, Idaho Falls, Idaho 83401.

Centronics Offers Walk-In Service For 700 and 730

HUDSON, N.H. — Centronics Data Computer Corp. is offering a maintenance option for its Model 700 and Model 730 Miniprinters and Microprinters that is a substitute for repair service house calls.

The printer manufacturer has instituted a plan that allows distributors, dealers and printer owners to return their machines to a local Centronics service center for repair or routine maintenance, rather than rely on a regular service visit. The walk-in service costs about 30% less than a standard Centronics at-site visit or contract.

Customers can be billed per visit or arrange for a longer term payment plan.

In addition, the company is now negotiating with a national courier service that will allow the customer to send an ailing machine to a nearby service center and have it returned when it is repaired.

While a printer is in the repair shop, users will be able to rent machines to keep up with their DP operations, the spokesman continued.

Currently, several walk-in service centers are scattered around the country in Philadelphia, Chicago, Dallas and other cities. Centronics hopes to have at least 21 locations operating by this September and around 50 carry-in service centers by June 1982.

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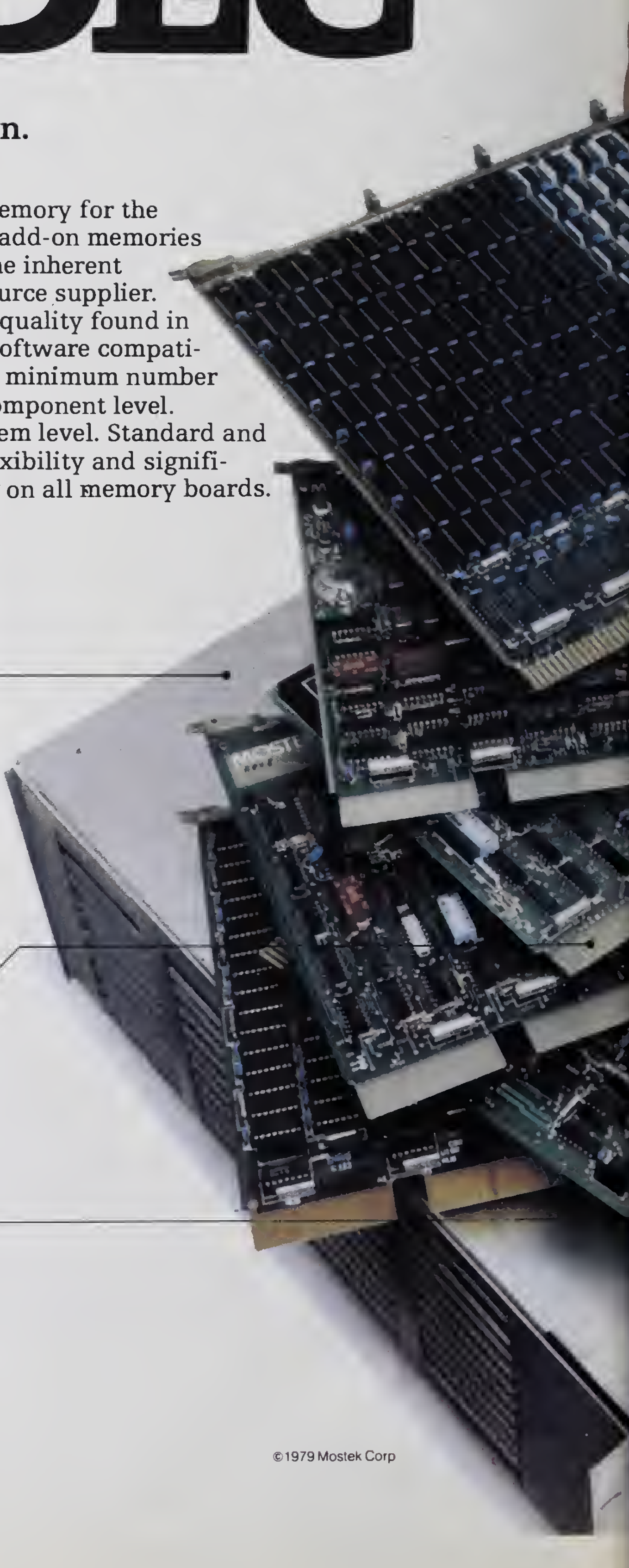
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Office Management System Based on Series/1

NEW YORK — An IBM Series/1-based office management system that can handle several stations and features word processing, electronic mail and document management has been introduced by DDP Systems, Inc.

The Computer System for the Management of Office Services (Cosmos) permits a variety of word processors to communicate with each other and share document management and electronic mail capabilities, a spokesman said. The system uses the Series/1 minicomputer as an office paperwork manager, delivering on-line, mass storage, high-speed draft printing and archival storage features.

Workstation Support

In addition, Cosmos can or will soon be able to support Wang Laboratories, Inc., Digital Equipment Corp., Lexitron Corp. and other vendors word processing workstations, the spokesman claimed.

Besides multistation communications and document storage functions, Cosmos has a version definition and revision control feature that makes the latest version of a document the most accessible one; a document security package that divides files into public and private categories using passwords; and a follow-up file that dates files for future reference, he continued.

The Series/1 provides facilities for standard application programming such as payroll, order entry and inventory control.

DDP Systems is offering an interface that connects the Cosmos to local or remote DP equipment in use by the user.

Management Reports

Finally, the office system can be used to prepare a variety of management reports. For instance, one report is a status listing that enables supervisors to locate any job being processed within the system, detailing all files with a document count and availability of file space.

Another available report is a statistical report that lists, by workstation, the number of documents called from and returned to a file, the spokesman noted.

Cosmos costs $35,000 to $100,000, depending on mass storage requirements and the number of word processors to be connected. Software sells for an additional $14,000 to $22,000.

DDP Systems is located at 132 W. 31 St., New York, N.Y. 10001. It also has an office at 3117 Trenholm Drive, Oakton, Va. 22124.

S-100 Gains Display Card

MOUNTAIN VIEW, Calif. — International Product Development, Inc. has announced a single-card computer display system designed for text-oriented applications on S-100 bus machines.

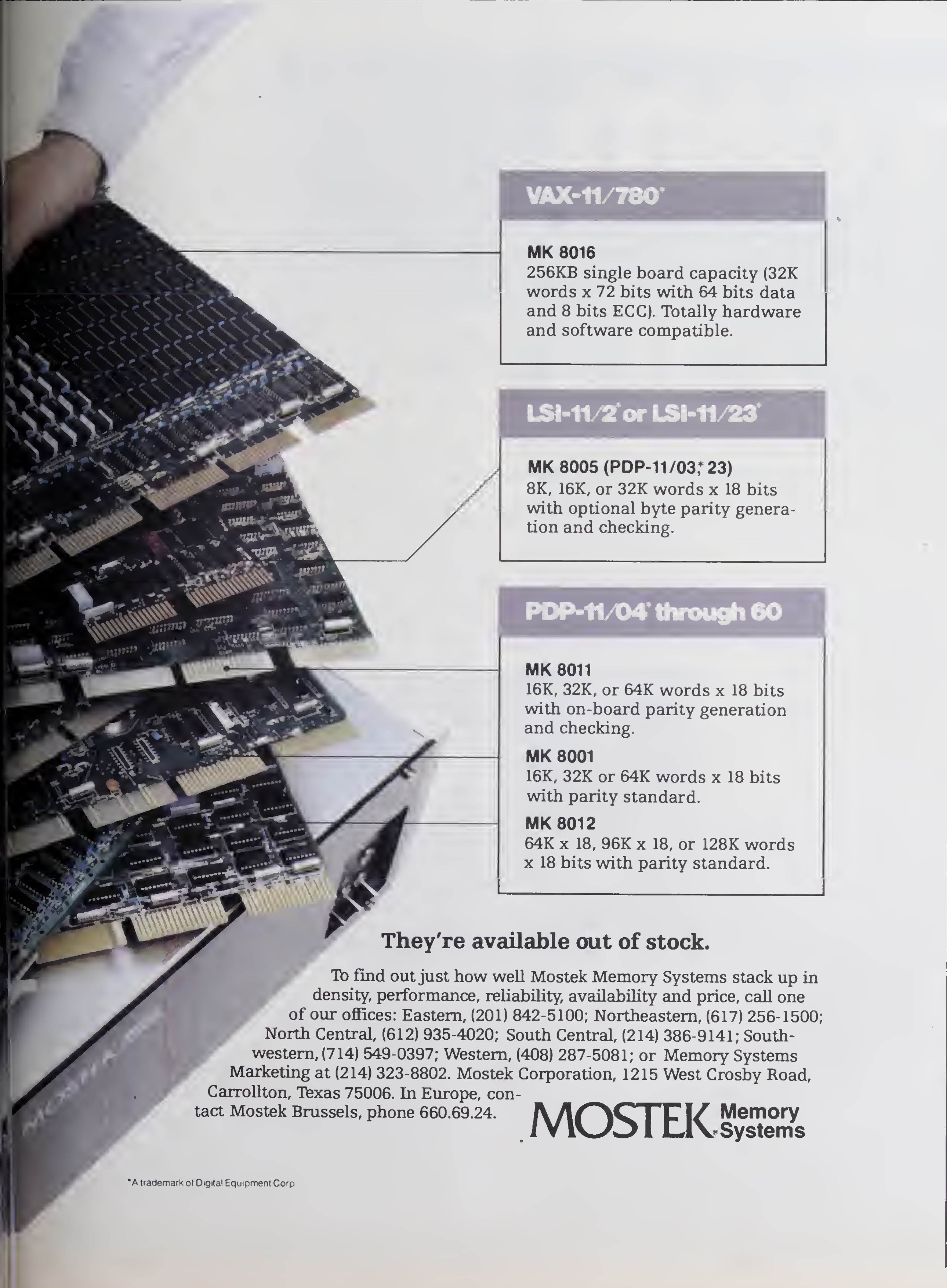
The VG100 can handle 80-char. widths and has programmable fonts allowing any character set up to 256 characters to be defined in an on-board random-access memory (RAM) with available software.

Attribute Bytes

In addition, every 8-bit character has an attribute byte, allowing the character to be modified in up to 256 different combinations such as blink, dim, bright, blank and reverse.

The device's entire character field can be changed at one time by the user, and adjoining character fields of any shape can be combined to create large, continuous characters.

The VG100 is configured in 12K bytes of RAM and costs $645 from the company at 1708 Stierlin Road, Mountain View, Calif. 94303.



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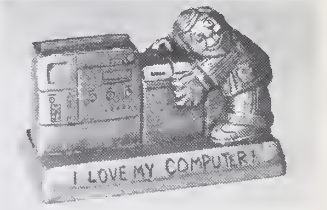


"I LOVE MY COMPUTER" Statues

Now choose from five models: IBM 370, NCR Century, System/3, "plain" (pictured above) . . . or the new "I HATE MY COMPUTER" which shows a frustrated DP'er strangling his system! Gold-finished, hefty plaster sculptures, perfect paperweight/conversation pieces. $9.95 each, postpaid. Brian Productions, 2949 Southfield Rd., Xenia, Ohio 45385

Dot Matrix Printer Debuts

BOSTON — DIP, Inc. has introduced a tabletop dot-matrix printer that features bidirectional printing and an adjustable tractor feed mechanism that accommodates paper widths up to 9.5 in.

The DIP-84 is designed to operate at 100 char./sec and incorporates a full 96-char. Ascii set. The unit is capable of printing upper-and lower-case characters at 80- 96- or 132 char./line on standard paper forms, and paper is fed to the machine at a rate of 10 line/sec, a spokesman stated.

Operator controls include line feed, top of form, self-test and variable vertical tab settings. In addition, interface options consist of Centronics-compatible parallel, RS-232C serial or 20mA current loop, he added.

The printer costs $795. DIP, Inc. is located at 121 Beach St., Boston, Ma. 02111.

Mini Eases Paper Manufacturing

(Continued from Page 77)

counting department. These devices are used for data entry and are directly on-line to the computer system so data files are updated minute by minute.

"We now have around 12 people who can handle data entry," Wilkinson pointed out, "and because they are conversant with the information they are handling, far fewer errors creep into the data files, which in turn helps us to be more accurate in our purchasing and production planning."

He reported that in the computer system's first year, sales, and hence data processing volume, increased by 12%, but during the same period the clerical staff was actually reduced by one.

Key Files

The inventory system developed by Wilkinson and his staff is built around two key data files: the first is the bill of materials file, which lists the exact quantity of each product that can be produced from a given roll of paper each weighing up to 2,000 pounds.

The second is the Routing file, which lists the manufacturing stages — such as printing, cutting, and binding — through which a product passes and the standard labor and machine costs incurred at each point.

The computer combines this information with actual production and inventory data to produce a series of reports and on-line files. With this information, production controllers can establish schedules to maintain optimum finished goods stock levels.

Purchasers can order paper knowing exactly how many rolls are required to meet the demands of production, and cost accounts can compare actual cost against the standard, so that discrepancies can be promptly rectified and profit margins safeguarded.

In-House Programming

Unlike most manufacturing businesses, S.W. Tablet makes a variety of products from a single raw material, so computerized inventory and production applications had to be developed in-house.

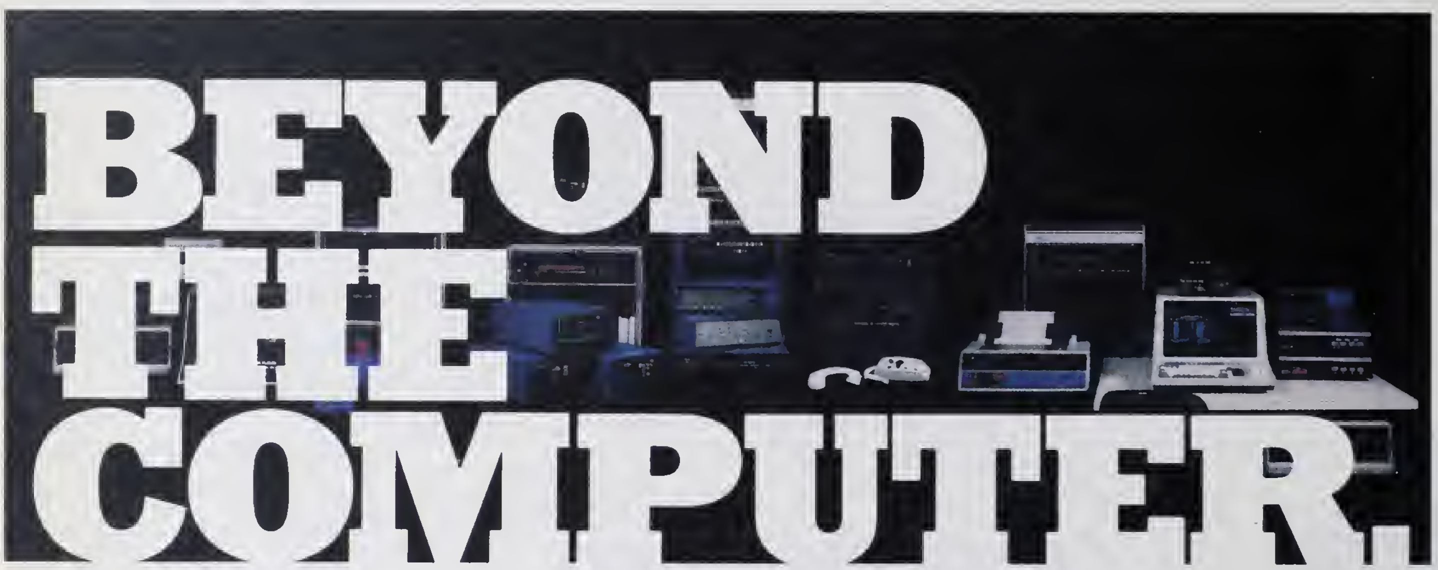
Programming is done entirely by Wilkinson and his staff using Cobol and RPG.

"We went to the HP 3000 firstly because it was compatible with RPG programming language in which our existing application programs were written" Wilkinson said.

"We also liked the fact that we can upgrade the system without difficulty whenever increased performance is necessary.

"Finally, the advanced operating system allows the computer to run several applications simultaneously."

The system is steadily being enchanced, and already it handles all the traditional data processing routines except for accounts payable and the general ledger, both of which may be placed on the system at a later date. "We are also contemplating using HP's Image data base management system, so the information currently held on specific data files can be manipulated and accessed with greater flexibility," Wilkinson observed.



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China Planning To Export Computers

By Bohdan O. Szuprowicz
Special to CW

HONG KONG — The People's Republic of China is planning to export computers, a Chinese hardware manufacturing official revealted in an exclusive interview with a magazine here recently.

Talking with the editors of *China Computer Monthly*, a Hong Kong-based trade publication designed to promote Western technology in China, the chief assembly engineer of the No. 2 Radio Factory of Changzhou indicated China's interest in entering the DP export market, possibly with the new DJS-110 minicomputer already in production at the plant.

This unprecedented revelation comes at a time when Western computer manufacturers have been speculating on the growth of Chinese DP markets for imported hardware and software. The announcement was not entirely unexpected, however, to some industry observers who believe that China, like the Soviet Union, plans to supply most of its computer needs from domestic production and always planned to get into the lucrative electronics export markets. The significant successes of Japan, Taiwan, Hong Kong, South Korea and Singapore could not have gone unnoticed in this regard.

Actually, China has already exported its computer hardware and DP technology to Albania and, in 1975, it assisted the engineering department of Tirana University in development and construction of the first Albanian computer. But Albania is a miniscule market for DP, and at the time China was extending massive foreign aid to Albania in return for its anti-Soviet stance and large shipments of

(Continued on Page 85)

Realigns Market Orientation

Adds Struggling to Match '79 Revenues

By Marcia Blumenthal
CW Staff

HAUPPAUGE, N.Y. — "Our revenues have to grow 35% this year just to be back where we were in 1979," Robert A. Degan, president of Applied Digital Data Systems, Inc. (Adds) recently declared as he described the challenge ahead for his company.

Why the worry? For one thing, the firm's largest OEM customer — NCR Corp., which provided nearly 40% of Adds' 1979 revenues of $51.9 million — decided last year to begin manufacturing one of the terminals Adds had been supplying.

The terminal was the Consul 580 — the NCR 101 which represented about half of the product sold to NCR, about $10 million in sales [CW, May 21].

Despite this revenue loss, Degan is not overly concerned that NCR will reduce its OEM purchases of three other Adds terminals. NCR buys those units in lower volumes than the Consul 580 and will think twice about manufacturing them, Degan maintained.

Of the 17 other OEM customers to which Adds sells, none accounts for more than 2% of the firm's sales volume.

Once Burned, Twice Shy

But once burned, twice shy, as the saying goes. After the shock of NCR's move, Adds began realigning its market orientation and decided on two basic strategies.

To shore up the $10 million revenue shortfall this year and ensure continued growth in the future, Adds started selling its terminals through distributors. Moreover, the firm is now putting the finishing touches on the first of a family of small business systems it will introduce next month.

To accomplish these two marketing objectives, Adds reorganized in December, creating two new, separate divisions, the Displays Division and the Systems Division.

Sales to both commercial and industrial distributors will contribute to revenue growth this year, while the foray into the small business system mart will begin to pay off in 1981, Degan said.

Photo by M. Blumenthal

Discussing Adds' latest market strategy are, from left to right, Frank Zelis, the Displays Division's director of marketing, Robert A. Degan, president, and Alan Dziejma, vice-president and manager of the Systems Division.

Discussing the terminal market, Degan said the total market for independent terminal makers has been pegged at $200 million annually by market researchers. This market is split about evenly between OEMs and distributors.

Until now, 80% of Adds' terminal business, which accounts for about 90% of its total revenue, has been with OEMs. While holding a 25% share of the OEM independent terminal market, the company has virtually ignored the $100-million-a-year distributor terminal market, Degan noted.

Recognizing the gap in its marketing effort, last year Adds established a separate sales force to sell to distributors. Within the next two years, Degan projected, 35% to 45% of the firm's display sales will be made to distributors.

Besides commercial distributors, Adds is targeting industrial distributors. The firm just concluded a distributor arrangement with Kierulff Electronics, Inc.,

(Continued on Page 83)

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Supershorts

Tymshare, Inc. has purchased the assets of Medistat, Inc., a wholly owned subsidiary of Blue Cross/Blue Shield of Wisconsin. The purchase price was not disclosed. Medistat's annual revenues are about $4 million.

— — —

Intel Corp. has purchased 80 acres of land in the Albuquerque, N.M., area and plans to use the parcel of land to build a 100,000-sq-ft plant to manufacture complex semiconductor devices. Intel said the plant will eventually employ 1,000 people. Construction will begin late this year.

— — —

The Palmer Organization, a Boston venture capital firm, has invested in Sentinel Computer Corp. of Cincinnati. Also participating in the $1.2 million investment are Gal Investment Associates, also of Boston, and the Hixon Venture Co. of Dallas.

— — —

Univac has consolidated its 10 operating units in Chicago. The rapid growth of Univac's business in Chicago and the Midwest necessitated the change. The firm said it has some $200 million worth of systems installed in the Chicago area.

— — —

Dennison Kybe Corp. has completed a manufacturing facility for its 8-in. flexible disks and 5.5-in. mini flexible disks and magnetic cards.

Bell Canada Adds Subsidiary

TORONTO — Bell Canada has formed a subsidiary, Intelterm Systems Ltd., that will market information products and provide support services for the Canadian market.

In particular, Intelterm will sell Teletype Corp.'s 4500 series including the 4550, which is an IBM 3270 emulation device, and the 4520 data entry system.

Moreover, the company will sell a microprocessor-based small business system.

Besides these information processing products, Intelterm will carry the Vydec word processing system. The firm has entered into a contractual arrangement with the Vydec, an Exxon Corp. subsidiary, for the Canadian distributorship.

Heading up the new organization is Thomas L. Rogan, who most recently was with Bell Canada's Computer Communications Group.

Electro Plans Tutorials

BOSTON — Two special tutorial seminars on strategic planning and very large scale integration (VLSI) will be featured at Electro/80 to be held here during the week of May 11.

The two all-day seminars, which will run concurrently on May 12, are not part of the regular Electro/80 program.

"Strategic Planning in a High-Technology Environment," the first of these seminars, will examine the problems of recognizing technical areas of importance which will influence a firm's product lines and strategies. Speakers for this session include Robert J. Allio, president of Robert J. Allio and Associates, Anthony P. Bourihan of Harvard University and the Management Analysis Center, Howard Anderson, president of the Yankee Group, and John D. Bridewell, senior planner with General Telephone and Electronics, who will also chair the session.

The seminar costs $85 for members of the Institute of Electrical and Electronics Engineers (IEEE) and the Electronics Representatives Association (ERA). The fee for all others is $100.

The second seminar, "VLSI: Current Status and Directions for the 1980s," will be chaired by Dr. J. Brock Barton, manager of the VLSI design branch of the VLSI Laboratory of Texas Instruments, Inc.

Others participating in this session are Dr. William T. Lindley of MIT's Lincoln Laboratory, Dr. Pallab K. Chatterjee of TI, Dr. Daniel P. Sieworek of Carnegie-Mellon University and Dr. Richard L. Sites of the Unviersity of California in San Diego.

The fee for this seminar is $95 for IEEE and ERA members and $110 for all others.

More information on this special program is available from Electro/80 at 1387 Washington St., W. Newton, Mass. 02165.

Computer-Readable Data Bases:

A Directory and Data Sourcebook, 1979 edition

edited by Martha E. Williams

Your Guide to
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This is by far the most up to date, comprehensive directory of machine-readable data bases ever published. It is a must for users of data bases and for reference librarians, for data base producers and information suppliers and for the many students and teachers working in this dynamic field. The 1979 edition lists more than 500 data bases worldwide, each listing containing: /name and producer of the base /its coverage /year of origin /number of items in the base /availability in either batch or online mode /pricing and other pertinent information. The directory contains more than 1000 pages and is available in a single easy to use volume, bound in a durable, flexible softcover material.

Users of the first edition, originally offered in 1976, will note that this edition lists nearly twice as many data bases and has some 50% more pages. Several indexes speed location of desired information: a two-level subject index, producer index, processor index and data base name index. Another invaluable aid is a listing of data bases that are now outmoded, that have been replaced by more current data bases, or whose existence cannot be verified.

The directory is compiled from the data base on data bases maintained at the University of Illinois' Information Retrieval Research Laboratory, under the direction of Professor Martha E. Williams. Williams, chief editor of **Computer-Readable Data Bases,** is a world authority on the subject.

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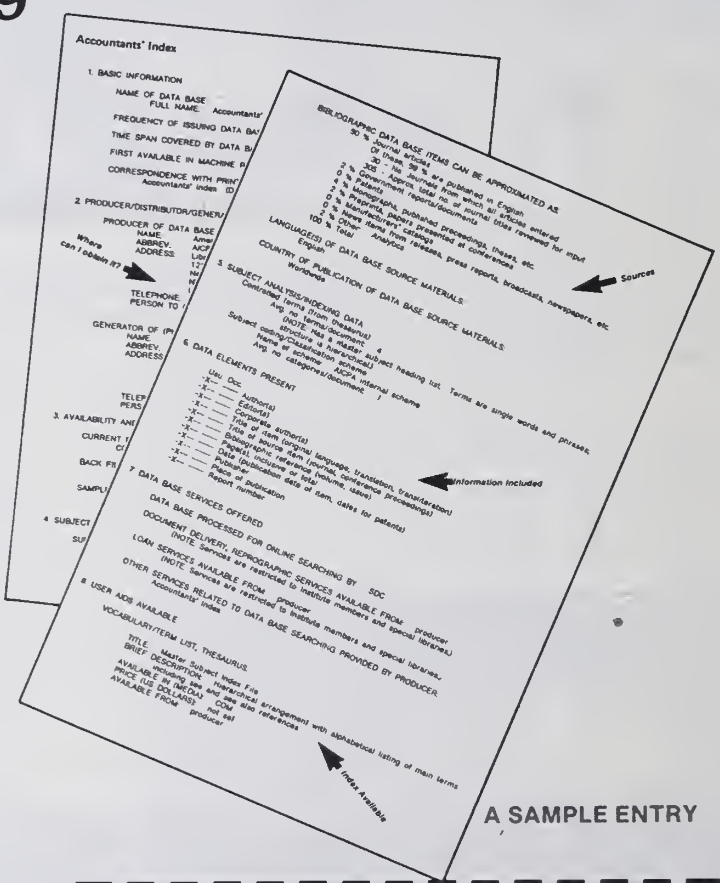
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Contracts

STSC Receives DOE Awards

BETHESDA, Md. — STSC, Inc. has been awarded contracts totaling more than $1.1 million by the Department of Energy (DOE).

The DOE awards call for the company's Management Technology Division (MTD) to provide economic analysis services over the next three years — $360,000 in the first year, with options for $800,000 over the following two years. The work will be performed for DOE's Office of Policy and Evaluation.

MTD will provide economic analysis of federal energy policies, domestic and foreign energy events and federal regulations for DOE.

Retail EFT Terminals Seen at $1 Billion in '89

NEW YORK — Terminals and related equipment for electronic funds transfer (EFT) in the retailing industry will carve out a market share of $1.1 billion in 1989, results from a Frost & Sullivan, Inc. (F&S) analysis show.

F&S anticipates that the use of customer/merchant-operated terminals (MOT) will be reduced because of high merchant labor costs, but that the use of automated teller machines (ATM) will increase. The terminal industry will see long-term financial services move to point-of-sale (POS) terminals with emphasis on paperless, debit-card transactions, the report predicted. Retail POS terminals will be interfaced to a bank's financial network.

The current payment terminal market base of approximately 8,000 units will increase to 142,213 total shipments by 1989, for a dollar volume of $336 million, F&S projected.

Authorization devices will account for 132,843 units, a market of $196 million, while the higher unit cost CPU-to-CPU interfaces will ship 9,370 modules for a market value of $170 million.

The 1989 installed base is estimated at 95,600, comprising 89,500 authorization devices and 6,100 CPU-to-CPU interfaces.

Banking terminals will be dominated by the purchase of ATMs, which will reach 24,086 for a total of $749 million. MOT shipments will reach 33,335 units, amounting to a much smaller market share of $82 million, the report indicated.

Other Markets

Magnetic card readers should reach a volume of $24 million by 1989. Large department stores, apparel stores and supermarkets are expected to install 6,100 integrated POS CPU-to-CPU interfaces, with an average of 20 terminals per installation.

If banks move toward optical coding on their cards, however, this market will not materialize, the report pointed out.

The concentrator market will be much larger — $75 million in 1989 — based on one concentrator per 150 terminals, with traffic generated from leased-line terminals and CPU-to-CPU interfaces. Each concentrator is expected to cost $75,000, F&S said.

Total retail transactions are predicted to expand to 94 billion in 1989, an average annual rise of 3% from the 68 billion recorded in 1978. Cash transactions are projected to increase to 67 billion, credit actions to 11 billion and check and debit/check guarantee transactions to 10 billion.

"The Financial Services in the Retail Environment" report costs $900 and can be obtained from F&S Customer Service Department, 106 Fulton St., New York, N.Y. 10038.

Adds Struggling To Match 1979

(Continued from Page 81)

Degan disclosed.

Industrial distributors take a supermarket approach to marketing: "They are concerned with how many inventory turnovers they make in a year," Degan explained. Moreover, they spend heavily for advertising.

While Adds is expanding its marketing effort for its mainstay terminal product line, Degan is excited about the upcoming introduction of its small business systems. As yet unnamed, the line will be priced from $3,785 to $12,000, according to Alan Dziejma, vice-president and manager of the Systems Division.

Right now there are three million to four million prospects for small business systems, according to Dziejma, who noted that unconventional distribution channels are needed to reach this new class of users. Adds will primarily concentrate on distributing its small business system through office products dealers and stores, newer channels that he said are gaining more widespread acceptance.

The small business system line will range from an entry-level model to a multiuser hard disk environment and span about 70% of the applications small business users need, Dziejma said.

Adds is aiming its small business systems at the under-$12,000 market because vendors selling their systems priced above $12,000 will be meeting IBM head on, he emphasized.

Adds currently has 50 pilot systems installed and plans to ship them on a regular basis by September.

However, the soon-to-be-introduced system is not Adds' entry into the small systems market. The firm began marketing its System 70 and System 75 four years ago. These systems are priced in the $12,000 to $20,000 range and now account for less than 10% of the company's sales volume.

The firm made major expenditures automating its plant last year, allocating $2.5 million for expansions and automated assembly equipment. Its Long Island plant doubled its capacity while expanding floor space only 30%.

The plant expenditures contributed to the firm's 27% decline in earnings last year, which totaled $4.7 million or 92 cents per share. In 1978, the firm earned $6.5 million or $1.23 per share.

Revenues advanced 10% in 1979, reaching $51.9 million compared with $46.8 million in 1978.

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IBM Witness Faults Competitors' Credit Status

By Connie Winkler
CW Staff

NEW YORK — IBM witness and investment expert Warren E. Buffett said computer-related companies had difficulty raising capital in 1972-75 because their credit ran out. They had had high debt-to-equity ratios in the prior period and thus could not get additional funding.

The argument is relevant to the U.S. vs. IBM antitrust case (where Buffett testified) because the Justice Department says 104 of these same companies could not raise money because of product and pricing actions by IBM in the 1970s.

Buffett — the Omaha, Neb., investor who parlayed $105,000 in 1956 into $100 million in 1969 — has been singled out in the financial press as an "investors' investor" and a "money master."

Buffett said he instructed the accounting firm of Price, Waterhouse & Co. to compute debt-to-equity ratios — also known as leverage — for the 104 companies first listed in this case by government economic witness Dr. Alan K. McAdams.

Companies with a debt-to-equity ratio greater than two-to-one would have difficulty raising capital, Buffett said.

Leverage Ratios

McAdams had contrasted the companies' ability to raise money in two periods, 1967-72 and 1972-75, and attributed the greater difficulty in the second period to IBM's Smash project announcement on prices and products including the 370.

"I hypothesized that the explanation for differential abilities to finance in the second period vs. the first period would be explained by leverage ratios, and List IV bore that hypothesis out in a very conclusive manner," Buffett testified. List IV was generally the list of companies, including Telex Corp., Memorex Corp. and Storage Technology Corp. that had trouble raising money.

During cross-examination, Justice lawyer John P. Hannigan, handling his first witness in this case, suggested one needed to know about the computer marketplace and IBM's actions before making such a statement, but Buffett disagreed.

Buffett also talked at length about the equity investment atmosphere in the late 1960s which he termed a "house of madness."

Like four previous IBM witnesses, Buffett testified about the accounting practices of Telex and Memorex and computer leasing companies, calling these practices "accounting gimmickry." On cross-examination he conceded that these actions were "squeezed within generally accepted accounting practices."

Lunchtime Investments

Because of his present responsibilities, Buffett said he had the power to sell during his lunchtimes about $750 million in stocks and bonds. However, the investor said he did not invest in high-technology companies, including computer-related ones.

"I think that the computer industry and the high-technology industry . . . [are] among a group of industries [about which it is] particularly difficult to have a clear view of a long-term future," he said.

Buffett, who has major holdings in a textile company and three newspapers including the *Washington Post*, said: "High-technology companies are ones where both the product and the customer's use of it are [areas in which] I don't feel I have a full understanding."

It was through the *Washington Post* that Buffett talked with Cravath, Swaine & Moore lawyers George Gillespie and Joseph R. Sahid — who represented him in court — about testifying in this case.

On the third and final day of testimony, Hannigan introduced Buffett's deposition testimony where the witness said plug-compatible manufacturers — whose accounting practices Buffett criticized — were specialized types of computer companies about which he did not know "a whole lot."

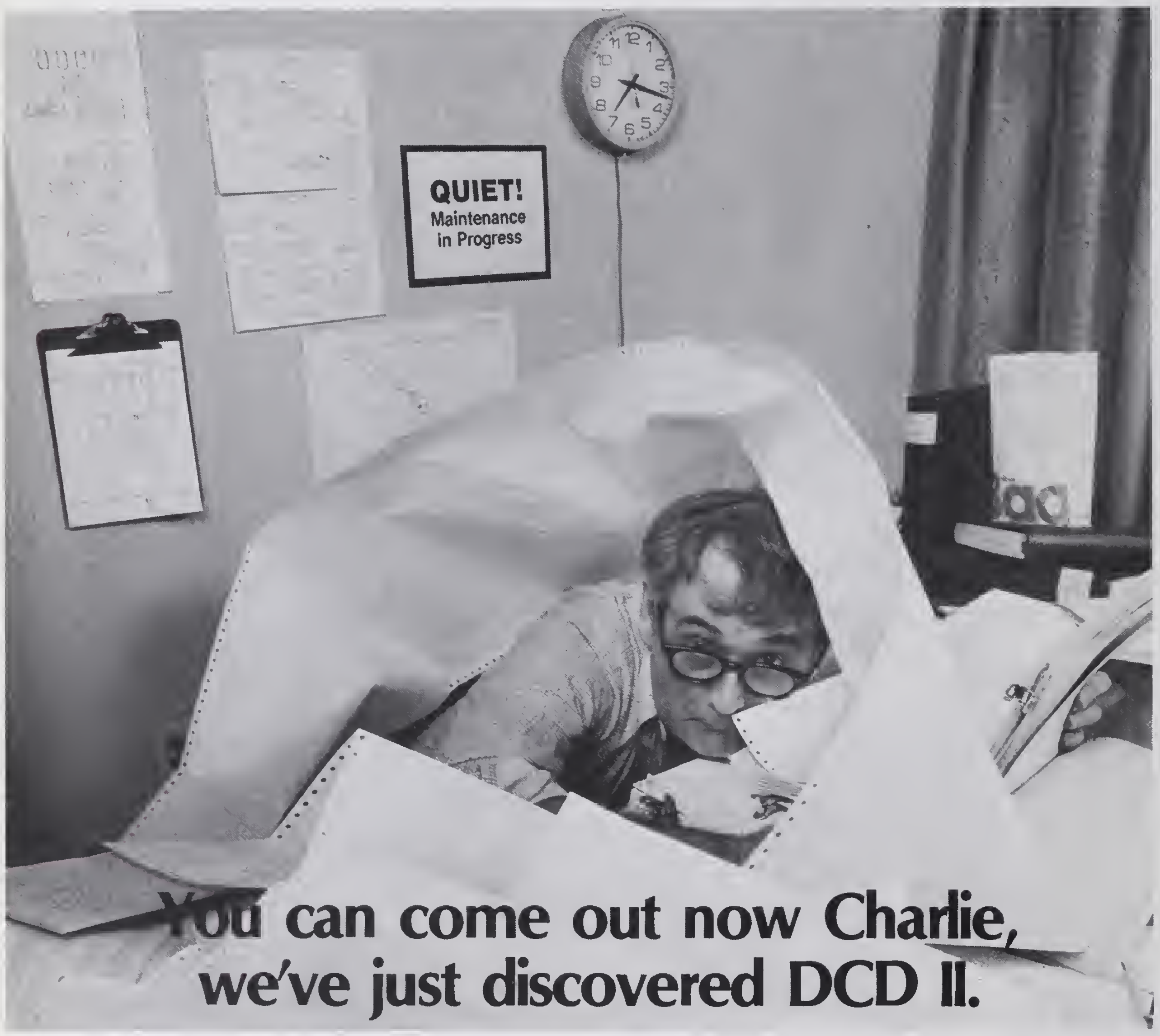
On the stand, Buffett said his answer would generally be the same today, but added that at the deposition he had financial information about these companies that he assumed was excluded by the question.

Orders & Installations

Norden Systems, Inc., a subsidiary of United Technologies Corp., has received an order worth $700,000 for its Omega very low frequency navigational systems from Aerolineas, a South American international carrier. The Omegas will be installed on the airline's B727 and B707 fleets.

Scientific-Atlanta, Inc. has received an order for five satellite earth stations and related electronics products, valued in excess of $1 million, from American Satellite Corp. for installation at computer data centers of Metropolitan Life Insurance Co. branches nationwide.

The Gas Service Co. of Kansas City has ordered a Univac 1100/81 processor and about 100 Univac UTS 400 intelligent terminals, valued at about $3 million, from Univac.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China Plans CPU Exports

(Continued from Page 81)

such strategic materials as chromium, nickel and cobalt, which are in short supply in China.

Chinese computers also appear regularly at the Canton Trade Fair and have been exhibited abroad in Canada and Germany during Chinese National Economic Exhibitions.

Now, it seems, China's DP export plans are much more ambitious. China does have a good chance of becoming a fair-sized DP manufacturing country — it has a relatively large and rapidly growing domestic market, which is controlled by the state, similarly to that of the Soviet Union. But unlike the Soviet Union, China does not control any captive DP markets.

As a result, large-scale production of some computer models could offer significant economies of scale and turn a very tidy hard currency profit for China if such products were accepted abroad. China's desire to obtain Western DP manufacturing technology could be linked to buy-back arrangements that would effectively introduce some Chinese-made DP products even in Western industrialized markets on an OEM basis at least.

Chinese electronics manufacturing facilities are believed to operate at very high gross profit margins and could yet turn out to be the most attractive offshore suppliers.

In addition, there are new developments on China's labor scene. A few weeks ago China announced the availability of teams of Chinese workers for foreign assignments at very competitive rates. Such teams may number hundreds of workers and come organized into operating units with Chinese managers, supervisors, foremen and even accountants.

This type of labor was offered primarily for construction work, but some financial analysts in New York believe China is also considering the possibility of earning hard currencies by offering large teams of programmers and systems analysts or undertaking large software projects for foreign clients.

If you can use Fortran and want to save money go to Page 17

Trade Shows: A Marketing Investment

By Quentin H. Douden
Special to CW

Trade shows perform an important marketing function in the sale of computer products — no other marketing method can assemble an audience of interested buyers, eager to learn the latest product and company news from the manufacturers who supply them.

Yet trade show participation is often costly, difficult to evaluate on dollars-and-cents return and highly time-consuming. It seems logical to ask, therefore, whether a set of marketing guidelines can be developed for planning to make the most of the computer trade show investment.

An examination of the elements that comprise show planning and participation suggests that this part of the marketing job can lend itself to organized planning, as do the other elements of marketing. Because of the nature of "show business," not enough exhibitors have followed such an orderly route in the past.

In many cases, show participation has been decided on a basis of habit, organization membership or the particular interest of someone in management in a certain show — or even the old threat that says "we have to be present because our competitors are." Then when results are unsatisfactory, the show rather than the exhibitor's approach to it may be blamed.

It may be a lot of work, but once trade show plans are built and used for a year, they represent a solid foundation on which future show activities may be built with little effort — just "retuning" for each new year's conditions.

The first year is the hardest — and here are some sugges-

(Continued on Page 86)

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Trade Shows: Investment With Rich Dividends

(Continued from Page 85)

tions on how to approach a trade show:

• *Preevaluating the coming show.* Which shows in the next 12 months are considered "musts"? What are the facts on attendance at previous years' shows, in terms of both numbers and buying authority of attendees? What specific results can you trace to past shows: sales, active inquiries, better customer relations in specific cases?

To supplement these facts and figures, get concerned people in your sales and marketing management to rate shows being considered — this may provide surprising results. And your customers, if surveyed by mail or by a research organization, will be glad to give you their opinions, from various levels of their management.

Of course, the audience at a given show may vary in importance to you from year to year, depending on your current objectives.

• *Objectives.* Try to develop a set of objectives for each show you plan to attend. They must be specific, practical and measurable; chances are that they'll be different for each show in which you participate.

Are you seeking 1,000 solid inquiries? This calls for one approach.

Are you seeking understanding of the operation of a complex system? Are you seeking to establish your company's excellence in engineering or technical know-how? This may call for highly technical exhibits — not just photographs, but actual engineering or lab processes under way in your booth — that will get under the skin of the most technically minded visitor.

Specific objectives for each show should be limited in number — remember, you can't accomplish *everything* in the largest ad or the biggest show exhibit.

Talking With Producer

After formulating objectives you are ready to talk intelligently — and, hopefully, far ahead of the shows' dates, with a good exhibit producer.

Start with generous lead time and use the services of a good exhibit producer to handle shipping, set-up, dismantling and return of your shows as well as their design and building. They are professionals; you and your salespeople are not, and the latter have a way of evaporating as soon as the show closes.

• *Budget.* A show budget for the year should include, of course, all space and exhibit costs, plus transportation, installation and dismantling and the local costs attendant thereto. Costs of collateral materials developed specifically for show use, plus any funds needed for special events, should be counted. These funds can be allocated roughly over the various shows selected.

The largest item — exhibit preparation costs — may be pro-rated over several shows, if your exhibits are planned to adapt themselves to your various objectives and can justifiably be amortized over the several-year time-span that you plan to use them (with minor modifications).

• *Objectives and exhibit design.* All too often, exhibitors rely on the development of an "all-purpose" exhibit which provides merely an elaborate (and hopefully impressive) background for booth activities.

However, if specific show objectives are developed (as they probably are for your ad space or direct-mail programs), the elements of an exhibit can be as powerful in accomplishing them as are the elements of an ad program.

If your company develops several major objectives for a given year's show activities, consider the design of modular exhibits. Where appropriate, you can then combine two or more for an effective presentation.

As in good advertising, stopping power, simplicity, good graphics and powerful delivery of a simple message are the key elements in exhibit design.

• *Special events.* These can be coordinated with show participation and include scheduled meetings to which selected show attendees may be invited and/or a lunch, dinner or cocktail party that includes a product demonstration, sales film or some similar promotion activity that supplements and enlarges upon the message carried by the exhibit itself.

• *Staffing.* The presence of the president of your company or the vice-president of marketing or research can make a deep impression not only on top execs in your customer companies, but on middle management people who will be flattered and impressed by the attention of a two-minute conversation.

In any case, make sure your booth will be strongly and fully staffed at all times by capable people by issuing, and getting agreement on, a firm schedule well in advance. A preshow staff orientation meeting is a must for most companies.

• *Measuring results.* If various methods of measuring results from each show are not determined in advance, it can be difficult to do it later. Visitors to your booth will probably take a minute to register and write their impressions.

Like any other part of the marketing process, the trade show pays rich dividends if carefully planned, thoughtfully executed and given the stature that "your biggest sales call" deserves.

Douden is president of Giltspur Expo Industries, Inc. and is active in the Exhibit Designers and Producers Association.

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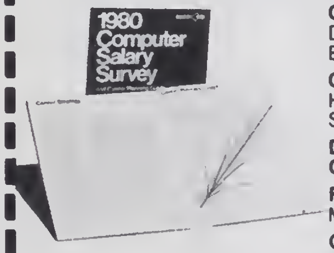

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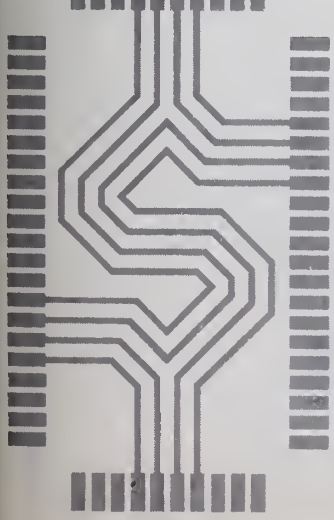

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Five years minimum experience in real time mini micro computer based systems required. Desire broad experience in RSX11-M or M plus related areas. Expected to be capable of providing project leadership and to participate as a member of a team. Working knowledge of Fortran and assembly language programming necessary.

SENIOR SOFTWARE ENGINEER

Three years experience in real time mini/micro computer based systems. RSX11-M experience desirable. Experience with Fortran and assembly language programming necessary. Expected to participate as a team member.

SENIOR HARDWARE ENGINEER

Three years minimum experience in digital logic, circuit design and real time computer interfacing. Programming knowledge desirable but not mandatory. Will participate as a team member.

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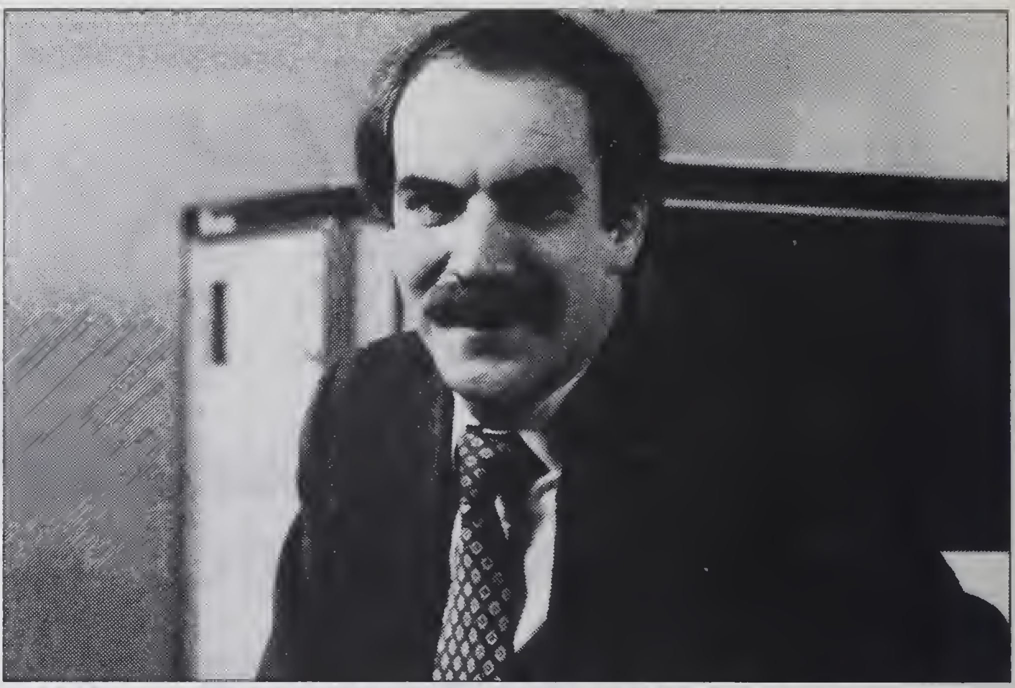

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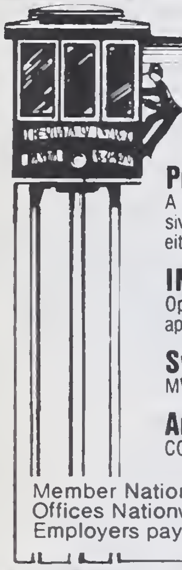

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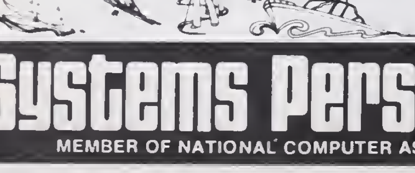

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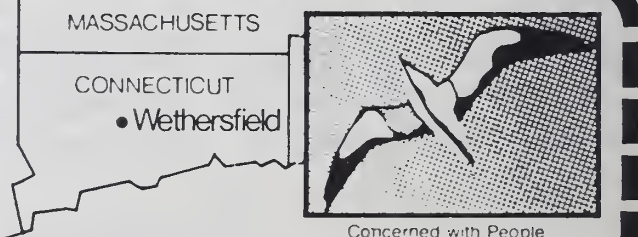

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COMPUTER SCIENCE PROFESSIONALS

Exciting Opportunities On The BEAUTIFUL SAN FRANCISCO PENINSULA

If you've ever considered moving to a place where fine schools, plenty of outdoor activities, and sunny year 'round climate abound, then we want to talk with you. We have opportunities in the following areas:

ADMINISTRATIVE PROGRAMMERS

Experienced Administrative Programmers to work on large scale applications. Requires a Degree and two years' experience in Administrative Applications. Training & experience in COBOL preferred.

SYSTEMS PROGRAMMERS

Requires experience at assembly language level with knowledge in any one of the following systems software areas: Operating systems; Communications; Teleprocessing; Interactive Systems, and Associated Languages, and N/C APT and graphics.

DATA BASE SYSTEMS

Design and development of an integrated corporate data base for Financial, Manufacturing, Engineering, Procurement, and Logistics Systems. Openings exist in the following groups:

- IMS Systems Software
- Data Base Design
- Data Administration and Data Base Administration
- Data Base Programming

AEROSPACE SYSTEMS DEVELOPMENT

Career positions on advanced aerospace programs requiring complex real-time computer based command and control systems. These are primarily ANSI X3.9 FORTRAN systems. Structured programming experience is highly desirable.

SOFTWARE

Conduct research to establish effective hardware/software tradeoffs. Develop methodology for and coordinate development of software design specifications using state-of-the-art mini and microcomputers.

SOFTWARE CONFIGURATION CONTROL AND MANAGEMENT

Control of implementation and disclosure (through formal documentation) of system software requirements.

CADAM IMPLEMENTATION

Perform overall coordination of CADAM implementation of all Space Systems Manufacturing applications. Utilize CADAM in support of initial Numerical Control and Tool Design inputs for Space Systems Division.

N/C SYSTEMS

Assist in the installation, modification, maintenance, and development of numerical control software on the UNIVAC 1100/43. Requires experience in FORTRAN computer programming.

COMPUTER SYSTEMS EVALUATION

Analyze, evaluate and coordinate requirements to support large scale Multicomputer systems. Perform computer equipment studies and determine alternate hardware changes. Develop plans and schedules for computer equipment acquisition and coordinate implementation.

HARDWARE/SOFTWARE ENGINEERS

Positions available in Washington, D.C./Baltimore

Senior engineering positions available for individuals with advanced degrees in Computer Science, Operations Research, Communications, or Electrical Engineering. Responsibilities will include the following:

- Provide advice and guidance on major contracts beginning with interpretation and drivation of requirements, to performance of technical trade studies.
- Recommend design-to-cost and design-to-performance approaches.
- Installation and test of subsystems and systems.

These assignments are for a minimum of two years in the Washington, D.C. and Baltimore areas with subsequent reassignment to our major facility in Sunnyvale, California.

For immediate consideration, please forward your resume to Lockheed Employment Office, indicating position of interest, c/o Dept. CW-317, P.O. Box 504, Sunnyvale, CA 94086. We are an equal opportunity affirmative action employer. U.S. Citizenship is required.

LOCKHEED

MISSILES & SPACE COMPANY

Data Processing Professionals

Immediate Openings in Dallas, Houston & Lubbock

Immediate openings available in Dallas, Houston and Lubbock for both experienced and entry level applicants. Positions require a 4 year college degree and permanent U.S. residency or U.S. citizenship. Entry level positions require a major or minor in Computer Science.

General Business Applications Programmer/Analysts

Design, develop, and implement systems in support of worldwide general accounting, financial planning, cost accounting, personnel, facilities and marketing functions. Experience with IBM 370, minicomputers, IMS, COBOL, or DL/I applications preferred.

Manufacturing Systems Programmer/Analysts

Design, develop, implement and support shop tracking, production planning and quality tracking applications for worldwide manufacturing systems. Experience with IBM 370, minicomputers, COBOL, PASCAL, IMS or DL/I applications preferred.

Scientific Applications Programmers

Develop and support computer aided design and interactive graphics applications. Experience with IBM 370, minicomputers, COBOL, FORTRAN, PASCAL, data base management, numerical methods and structured programming preferred.

Data Base Analysts

Design, develop and support IMS data bases and support programmers with consultation, debugging and design assistance. 3-5 years experience with DL/I applications programming and IMS data base design required.

Data Base Development

Design, implement and support new CODASYL data base management system for the TI-990 series minicomputer with emphasis on support in a distributed processing environment 5-8 years experience in data base systems implementation experience preferred.

MVS/JES 3 Operating Systems Internals

Modify and troubleshoot IBM operating system. 3-5 years experience with IBM operating systems and recent experience with MVS/JES 3 or TSO.

Office Automation Software Programmer/Analyst

Analyze, design and develop a word processing/data processing minicomputer system with an emphasis on evaluation and enhancement of performance. 3-5 years experience in multi tasking, disk-based operating systems using Assembly language.

Computer Scientist — PhD — Dallas

Advanced strategic evolution of Data Processing Technology and Systems Architecture. Develop practical programs to implement emerging technology. Anticipate future trends and capitalize on them. High internal visibility position with worldwide scope and large impact. A PhD in Computer Science is required. Industry experience preferred.

If you wish to work in this highly motivating and challenging environment, send your resume in confidence to: John Heft, P.O. Box 2103 Richardson, TX 75080. Or call collect (214) 238-3216.

TEXAS INSTRUMENTS
INCORPORATED

An equal opportunity employer M/F

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the answer is clear.

Clear Lake, that is, If you'd rather be sailing, fishing, boating, or skiing, then you should be working for Ford Aerospace and Communications Corporation. We're located in the Clear Lake area, situated by Galveston Bay, just 25 miles from the Gulf of Mexico, known for excellent deep sea fishing. Around the lake there are numerous marinas and yacht basins that distinguish the area as the boating mecca of the gulf Coast. And we're a comfortable distance from the big city—just 30 minutes from downtown Houston. Our career opportunities are equally attractive. As a leader in a custom data processing systems for large scale ground based communications, command and control applications, we have immediate openings for the following professionals.

Assembly Language Programming: Design, code, verification, and documentation of assembly language programs in a real time environment. Telecommunication and/or process control experience using micro/mini computers is a definite asset.

Application Programmers: A wide range of openings exist at all levels for applications programmers proficient in assembly language, FORTRAN IV, or COBOL on all size machines. Experience with Intel, Interdata, DEC, Varian, or IBM processors a definite asset.

Data Base Analysts: Varied opportunities in developing computer based systems in the category of DATA BASE MANAGEMENT SYSTEMS such as IMS, TOTAL, GIM, or DBMS. Applicants must have varying degrees of experience in data base designing, implementing, administration, data base generation, and be capable of consulting with system users and programmers relating to data base applications.

Systems Programming: OS internals experience on micro; mini, or large scale computer systems. Design and implementation of I/O drivers, systems enhancement, and system utilities highly desirable. Experience with WCS is a plus

The above positions are for long term assignments in our Space Shuttle support programs. We can offer highly competitive salaries and an outstanding benefits package, as well as excellent opportunities for advancement. What's more, Texas doesn't have a state income tax. So if you're looking for a career opportunity that won't interfere with your fishing, or fi you want to get away from the big city fro more than just a weekend, the answer is clear... Ford Aerospace & Communications Corporation. For more information CALL COLLECT or send a resume to Mr. John Brown or Mr. Gary Hunt, Space Information Systems Operation, Dept. AJC, P.O. Box 58487, Houston, Texas 77058, (713) 488-2783.

Ford Aerospace & Communications Corporation

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WHY JUST VACATION HERE WHEN YOU CAN LIVE HERE EMPLOYMENT WITH US IS AS SUNNY AS THE WEATHER

We are looking for a few good data processing professionals and are prepared to pay top salary for top notch analysts. We are an IBM 370 DOS/VS manufacturing environment. We want heavy COBOL programmers who prefer to work independently.

Our paid overtime has made us the hottest DP shop in Miami. Salary ranges $19,000 to $23,000 with complete benefits package. Please send resume in confidence to:

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2398 N.W. 119th Street
Miami, Florida 33167

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SENIOR SYSTEMS PROGRAMMER

Worldwide leader in the offshore engineering and construction industry has a position available in its New Orleans based Corporate headquarters for a Senior Systems Programmer.

Candidate should have a BS degree in Computer Science or a related field. Four years experience in data processing and a minimum of 2 years experience with teleprocessing software. Duties will include providing detailed technical support for our teleprocessing software, TCAM MCP support, NCP generations, debugging, physical link error analysis and recommendations on new software enhancements for our network.

Position offers excellent salary, benefits (company paid health insurance, disability plan, vacation, life and accident insurance) and opportunity for advancement. Send resume, including salary history in complete confidence to Lou Sannino:

J. RAY McDERMOTT & Co., INC.
P.O. Box 60035
New Orleans, LA 70160

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Data Processing and Communications

BEIRUT BOGOTA **NEW YORK** LONDON MIAMI GENEVA MEXICO CITY TOKYO
PARIS **HONG KONG** NASSAU SAO PAOLO **SANTIAGO** RIO DE JANEIRO

Our growth in international banking has been extraordinary.

It's opened a "world" of opportunity! -Overseas and in NYC.

In just 15 years, Republic National Bank of New York became the 41st largest bank in the US—Phenomenal growth based on people, capital, and business.

Exciting, innovative, dynamic banking, and thorough, imaginative, dedicated people make Republic National Bank of New York one of the most important institutions in the country and worldwide. We have representative offices in Europe, the Caribbean, South America, Hong Kong...and more!

We are seeking exceptional individuals who have the ambition and drive, and the desire to be associated with a leader in the international banking community. These individuals should have a proven record of accomplishment in Data Processing with emphasis on software applications to the banking industry.

You'll find Republic National Bank of New York an exciting and vibrant "world" to be part of. We're a people-oriented company. Our management recognizes and rewards achievement, and offers opportunities for rapid career advancement. Salaries are exceptional; our benefits package is what one would expect of a company in our leadership position.

To Schedule an Interview in Miami During Interface '80,
March 17-20, Call: Joseph J. Palya, Collect,
at 212-930-6326

If unable to interview at this time, please send your resume, in confidence (including position preference), to: Joseph J. Palya, Personnel Officer.

SANTIAGO, CHILE

DATA PROCESSING MANAGER

This is an exciting opportunity for a creative Data Processing Manager to embark upon a fast-track career at our new, ultra-modern Santiago computer facility. You will lead a technical systems team, be responsible for daily computer operations, and the coordination of DP activities with the NYC software team. Heavy management experience, excellent interpersonal skills, and a thorough knowledge of DEC operations required. Fluency in Spanish (both written and oral) essential; knowledge of Cantonese would be considered a plus.

NEW YORK OPPORTUNITIES

PROGRAMMERS and ANALYSTS

NEW YORK CITY BASED

Expansion due to pending acquisitions has created a number of openings in New York City, involving development, installation, and maintenance of software systems for our branch offices. IBM, CICS, POWER DOS/VS experience required.

NEW YORK CITY BASED
LIGHT US TRAVEL

Our Factoring Subsidiary has recently entered a period of significant expansion. To assist in performing credit, collection, bookkeeping, data processing and counseling services for clients, they require Programmers and Analysts who have heavy DEC experience for the development, installation, and maintenance of software systems.

NEW YORK CITY BASED
INTERNATIONAL BANKING GROUP—LIGHT TRAVEL

These are exciting positions in a dynamic, forward thinking group. To qualify, Programmers and Analysts must have heavy DEC experience for the development, installation, and maintenance of software systems.

DATA COMMUNICATIONS TECHNICIANS

Maintenance of local and remote low and medium speed digital and analog data communications networks. Electronics training and at least two years experience required. Must know modems (asynchronous and synchronous), fault isolation techniques, multiplexers (time, frequency, and statistical), and common carrier services. Ability to interface with users essential.

OVERSEAS TEAM

MANAGER/COORDINATOR

NEW YORK CITY BASED
HEAVY OVERSEAS TRAVEL

You'll head up a team of five-six Systems Programmers in the development, installation, and programming of software for our overseas branches, initially in Santiago, Chile, and then Hong Kong. The team will also maintain existing banking software. Management experience is required, with knowledge of systems and programming highly desirable. Fluency in Spanish essential; Cantonese a plus.

PROGRAMMERS and ANALYSTS

NEW YORK CITY BASED
HEAVY OVERSEAS TRAVEL

Challenging opportunity to join our special team in the development and maintenance of software at our overseas branches. Initially in Santiago, Chile, and then Hong Kong. Requires heavy DEC experience. Fluency in Spanish essential; Cantonese a plus.

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Responsibilities will include coverage of our CPU installed bases with openings in the New Jersey, Atlanta, Kansas City, MO, New York City, Phoenix, Boston, Houston, Detroit and Washington, D.C. areas providing Magnuson Computer Systems customers with hardware and software support.

We are interested in VM, OS/VS1, DOS/VS, MVS professionals and 360/370 I/O and CPU Field Engineers.

We offer ground floor growth opportunity and our compensation and benefit package includes company paid medical, dental, hospitalization, life insurance and free prescription drugs. Our salaries are very competitive.

Please submit your resume to **Bill Pugelli or Matt House, Magnuson Computer Systems, 2902 Orchard Parkway, San Jose, CA 95134. Or call them collect at 408/946-8100.**

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SAUDI ARABIA

SYSOREX INTERNATIONAL, Inc., a rapidly growing systems management company, developing innovative multi-technology systems in Saudi Arabia seeks experienced operations personnel for the following positions:

COMPUTER OPERATIONS SHIFT SUPERVISOR

You will be responsible for the shift operation of a large-scale IBM OS teleprocessing system data conversion effort and micrographics production. Position requires min. 4 yrs. solid DP background including 1-2 yrs. directly related operations supervision.

SR. COMPUTER OPERATORS

We are seeking lead operators on assigned shifts in our Data Center. You will be responsible for maintaining and operating our large-scale IBM OS computer equipment. These positions require min. 3 yrs. experience as a Senior Operator in an IBM OS teleprocessing environment.

Sysorex offers excellent salaries commensurate with experience, regular merit increases, bonus eligibility and a comprehensive benefits program which includes 30 days annual vacation with paid round trip transportation for employee and family to place of residence, 15 paid holidays, free furnished family housing and free education for children. Please send resume (salary history required) to **Harry T. Delk, Director of Personnel, Sysorex International, Inc., 10590 N. Tantau Avenue, Cupertino, CA 95014. (408) 996-9363.**

SYSOREX
Sysorex International Inc.

Olamic Systems Corporation invites sales professionals with at least 3 years experience in hardware or software sales to inquire about career oportunities in the following geographic areas - Atlanta, Boston, Chicago, Denver, Houston, New York and San Francisco.

Your background should include a successful track record in developing new business and maintaining customer relations at peak satisfaction levels. Candidates selected for this ground floor opportunity will form the foundation upon which our plan for rapid growth will be based.

Sales Responsibilities will include:

- Direct sale of network software products produced by our Software Publishing Division.
- Direct sale of consulting services for development of customized applications using our relational database management systems software.
- Management of local support and administrative staff.

Please address personal data to:

olamic

Olamic Systems Corporation
Software Publishing Division
503 North Euclid Avenue
Bay City, Michigan 48706

GET AN EDP JOB ANYWHERE

Analysts, project leaders, programmers with more than a year's experience let us help you find a better job. For a decade we have been placing EDP professionals like you all over the country through our network of 22 national offices. Send your resume or call

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SYSTEMS ANALYSTS AND PROGRAMMERS

Job dissatisfaction, complacency, and frustration are the biggest obstacles to overcome to achieve one's career goals — and, never being challenged by new goals. Everyday new career opportunities pass us by because we are unaware of their existence. Let us keep you abreast of what your true value is in the market place. Absolutely no obligations, please call or write Keith Reichle, Data Processing Specialist.

The National Personnel System
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of CHARLOTTE, INC.
One Fairview Plaza, Suite 406
5950 Fairview Road, Charlotte, NC 28210
(704) 554-8771

Area Education Center Manager

Wang is currently opening education centers throughout the U.S. We have management positions available in L.A., Chicago, and Washington, D.C., for individuals with the following qualifications:

If you're currently training users of a top name computer, you're our kind of person.

Your main focus will be managing instructors, while working with our District Managers to define local training needs. You'll also be enhancing, developing and implementing instructional materials to satisfy these needs.

You're a self starter, with management experience in data processing and excellent communications skills. You're thoroughly knowledgable about the field, especially systems similar to Wang's; you have a Bachelor's Degree, preferably in an EDP-related field.

You're ready to grow in our forward-looking structure. You enjoy visibility, and appreciate the earned rewards of a job well done.

We offer excellent salary and benefits including profit sharing, stock purchase plan, stock bonus plan, medical and dental insurance. Please send resume including salary history to Paul Colantuono, Wang Laboratories Inc., Dept. C-12, 20 South Ave., Burlington, Ma. 01803.

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Telecommunications Software Professionals:

OUR COMPUTERS WANT TO TALK WITH YOU

Some of the best computer systems in the business are looking for new ways to express themselves. Maybe you're the one to make this happen.

Wang is one of the top manufacturers of computers and word processing systems of all sizes. We're #1 in CRT-based word processing, #2 in small business computers. Now we're seeking to establish and maintain a leading posture in telecommunications, involving state-of-the-art networking and protocols.

Wang is committed to providing the resources you need to get results. We're moving into a brand new facility—a 12 story tower with fully modern equipment. The right kind of environment for you to achieve your best. We're determined to make Wang the best in telecommunications, so join us and together we'll start new telecommunications projects.

Last year this group grew 400%. We expect our telecommunications development and support staff to double in the next 12 months, and you can shape your career as you grow with us.

If you're talented in telecommunications...then let our computers know what you have to say.

Telecommunications Systems Programmers Associate to Senior Level Project Leaders

If you're a design oriented software development specialist who is not only comfortable with on-going telecommunications standards such as 3270, HASP, x.25 and SDLC/SNA but also capable of addressing the long range projects of the future in protocol and networking development, then we may have a position for you.

Systems Programmers are needed to design, develop and maintain telecommunications systems for our total product line. Positions exist in our Development, Systems Engineering, and Product Support areas and offer a challenge unparalleled in other organizations.
These positions are new and represent ground floor opportunities for total systems responsibilities.

Telecommunications Software Technical Writers

Positions exist for qualified writers who are interested in researching, organizing, and writing telecommunications related documents. Projects include Operators' Manuals, Network/Operations/Communications Managers' Manuals, Technical Staff Programmers' Guides and data sheets. Two or more years technical experience and a Bachelor's Degree are required.

If you are interested in the above positions please send your resume, including salary history to Susan Morse, Professional Recruiter, Wang Laboratories, Inc., Dept. CW-11 **, One Industrial Avenue, Lowell, MA 01851**

Telecommunications Systems Support Analysts

Software verification is this group's specialty. We make crucial decisions regarding the effectiveness of new developments in a hands-on environment, from minis to mainframes.

Working with all Wang's product lines you will be responsible for the support activities of all Wang's TC products and write telecommunication application software in higher level languages. Frequent interaction with marketing and development will be required.

The Telecommunication Support Analyst will support the pre and post development and pre-installation activities as well as participate in the definition, specification and evaluation of Wang's telecommunication products.

To qualify, you should have a strong data communications background including experience with protocols, modems, networks, and telecommunication hardware and software. Prior experience with large IBM systems 3270 networks or RJE terminals is desirable.

Telecommunications Remote Diagnostic Engineers

Individuals with strong hardware background (BSEE or MSEE) are needed to locate potential problem areas in the entire Wang line of telecommunication products.

You will design fault isolation diagnostics and power-up diagnostic software and real-time, remote, micro-code, environment utilizing micros through mainframe. You must be able to effectively interface with both hardware and software development teams.

If you are interested in the above positions please send resume including salary history, to Thomas Bahlo, Professional Recruiter, Wang Laboratories, Inc., Dept. CW-11 **, One Industrial Avenue, Lowell MA 01851.**

Wang offers excellent salary and benefits including profit sharing, stock purchase plan, stock bonus plan, medical and dental insurance.

INTERFACE '80

While at Interface '80
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We Are Seeking People Who Are Looking For:

- More Challenging Assignments
- More Opportunity To Develop Technical and Business Skills
- More Recognition For Achievement
- More Growth Opportunities — Technical and Managerial
- More Financial Rewards Based On Performance

We are the Communications Division of a leading New York consulting organization, specializing in the development of software systems for the telephone industry. In addition to developing future sophisticated packages for telephone companies, we are currently marketing the most advanced telephone software systems in the industry!!

Our Current Opportunities Include:

- PROGRAMMER/ANALYSTS
- SYSTEMS ANALYSTS
- TELECOMMUNICATIONS SPECIALISTS
- SENIOR SOFTWARE DESIGNERS
- PROJECT MANAGERS

All of the above positions require a minimum of 3 years IBM On-Line systems development experience. CICS and Data Base experience would be a definite plus.

These positions afford qualified candidates the opportunity for extensive travel in the United States and abroad.

If you qualify, you'll join a leader in the data processing industry — a leader in providing growth opportunities — a leader in people recognition — and a leader in providing financial rewards. For more information on these and other future opportunities, please contact:

SUSAN JAMES

AUXCO

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Data Processing

EDP PROFESSIONALS

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* **BUS. SYSTEM ANAL.** 3-5 years, XDS experience and mfg. (XMS).	**To $25,000**
* **PROG. ANAL./RPG II** System 3/15D CCP and Heavy Mfg.	**To $25,000**
* **DATA BASE CORP. MANAGER** IDMS, IMS 370/OS. With 10 years experience.	**To $45,000**
* **PROJ. LEADER — BANKING** To supv. new dev., 370/OS or Burroughs.	**To $28,000**
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Multiple job opportunities in EDP Auditing, Data Base, Banking, and Manufacturing.

Send resume or call:

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Rich Abreau or
Jim Dupre
2 Palo Alto Sq. #212
Palo Alto, CA 94304
415-493-8700

Jerry Anderson or
Bob Couch
111 Pine St. #1510
San Francisco, CA 94111
415-434-1900

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Our offices in Maine, Massachusetts, Rhode Island and Connecticut serve the industry leaders. We are in daily contact with decision makers in Data Processing and never have there been so many excellent opportunities.

With 15 years of solid experience in serving the Data Processing field, we have the unique ability to assist and advise you on important matters such as a qualitative match, growth and advancement. Our reputation for competence and confidentiality is unsurpassed.

Call or write us in confidence.

Examples of typical opportunities are listed.

SYSTEMS MGR. (Near Boston). Direct professional staff of 40 on applications. OS Cobol, IMS, tp, retail systems, and management depth. **$36-$40,000**

BUSINESS SYSTEMS ANALYSTS (In Southern Connecticut). Several openings in Fortune 500 firms. Background in mfg and financial systems, and exp on large IBM hardware. **$30-$35,000**

PROJECT LDR, SYSTEMS ANALYSTS, PROGRAMMERS (In Rhode Island). Univac 1100 Cobol experience. Rapidly growing (+43% in 1979) electronics firm. **$20-$28,000**

TECH SPECIALIST (Near Hartford). Individual must have RSTS/e and RSX experience. State-of-the-art company, flexible working hours. **$23-$25,000**

BUSINESS S A (In Maine). Openings in three major hq locations. Minimum of 3 years in mfg/financial systems on large scale IBM systems. **$21-$23,000**

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140 Sherman Street **Fairfield, CT 06430** (203) 255-9145	477 Congress Street **Portland, ME 04101** (207) 773-4749	1150 New London Avenue **Cranston, RI 02920** (401) 463-7600

Project Manager

Our Bay Area client has an excellent opportunity for an EDP Project Manager. The successful candidate's background should include:

- Strong leadership skills
- The ability to communicate — both verbally and in writing to all levels of management.
- Knowledge of Banking or Manufacturing Applications and Time Sharing Applications.
- Good working knowledge of COBOL, ALC or FORTRAN.

This position offers an excellent salary and compensation package. We are consultants to management. For immediate and confidential consideration, send resume and salary history to Dan Perkins, Professionals for Computing, Inc., One Maritime Plaza, Suite 1350, San Francisco, CA 94111. (415) 956-7120. Employer assumes fee.

professionals for computing, inc.

SENIOR TECHNICAL WRITER

Jarrell-Ash Division of Fisher Scientific Company is a world leader in the manufacture of Computer-Controlled Spectrometers.

A new position exists for a Technical Writer in our Software Development Department. The chosen candidate for this position will combine inputs from our hardware and software personnel to generate Technical Specifications and Procedures for System Operations.

If you have a BS in a technical field, preferably Computer Science, with 3-5 years technical documentation and writing experience, we have an exciting opportunity to offer you along with a competitive compensation and benefits package.

Please send resumes to the attention of Ruth May, Personnel Manager.

JARRELL-ASH DIVISION

Fisher Scientific Company
590 Lincoln Street
Waltham, MA 02154

An equal opportunity employer, M/F.

EDP OPPORTUNITIES

MANAGEMENT

SOFTWARE- Advanced technology Tcam CICS NCP 3705 atc plenning cennad softwara facilitias mgmt	$40K
PROJ MGR-Financial COBOL investment banking	$40K
O.R. Investment banking/corp finance statistician	$30K
PROJ Mgr- Financial systams on-line, new A/R, stds	$38K
PROJ ENG -microprocessors dasign softwara	$39K
SOFTWARE IMS intarnals MVS	$38K
MGR TECH SVCES MVS JES 2 Vsam	$35K
MGR V.M. support OS MVS VSAM	$38K
MGR Performanca maasurament MVS	$38K
SOFTWARE MGR DOS VS DL 1 CICS conversion to OS	$42K
PROJ LDR-CICS DOS DL 1,0S	$35K
PROJ LDR TCAM ordar batch	$35K
PROJ LDR-CICS internal	$35K
OPERATING Syst mgr-VM VS 1 CICS plenning program products	$40K+
DIRECTOR-proparty/casualty Insuranca DOS	$45K
SYSTEMS SUPPORT MGR-CICS DL 1 distributad	$43K
FINCL Systams Davalopmant Mgr	$43K
PROJ LDR-IMS OS CICS PARS trevel	$Open
BIZ SYSTEMS-MBA	$38-41K
PROJ MGR- PDP MUMPS	$35K
TELECOMMUNICATIONS-BAL lge mainframa/mini	$35K
CONSULTANT-multi mini vandor, deg	$35-41K
PROJ LDR-HP 3000 Imaga Ouery COBOL	$31K
SYSTEMS ENGR-East coast trvl BAL DASD	$35K

NEW JERSEY

SYS PROG-JES 2 SMP	$35K
DIGITAL SYS ENG PDP 11 VAX arithmetic memories, controllars	$35K
DISPLAY SYST Eng-Vidao projaction	$35K
SOFT/TELE DOS/VS CICS	$35K
CONSULTANT-PL 1,ALP Fortran	$28-30K
CLANG UNIX 11/70-45	$33K
PROJ LDR-Fienciel systams A/R corp HQ	$38K
PROJ MGR-revolving cradit ACP-PARS	$35-39K
ASST DIR-menufecturer upgrading DOS on-lina edvancad dagraa	$40K
PROJ LDR-CICS VS 1 DOS DL1	$33K
PROG ANA CICS DL1	$29K
T/P CICS TCAM SNA VCAM	$33K
BIZ SYSTEMS Anel advanced dag.	$38K
SOFTWARE-Oparating systams MVS	$35K
EDP Auditor Fin Systems 50% Int1 Tvl	$33K

CONN/WESTCHESTER

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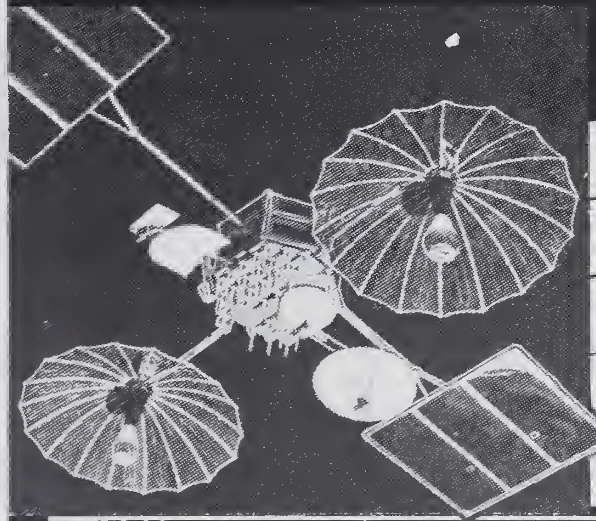

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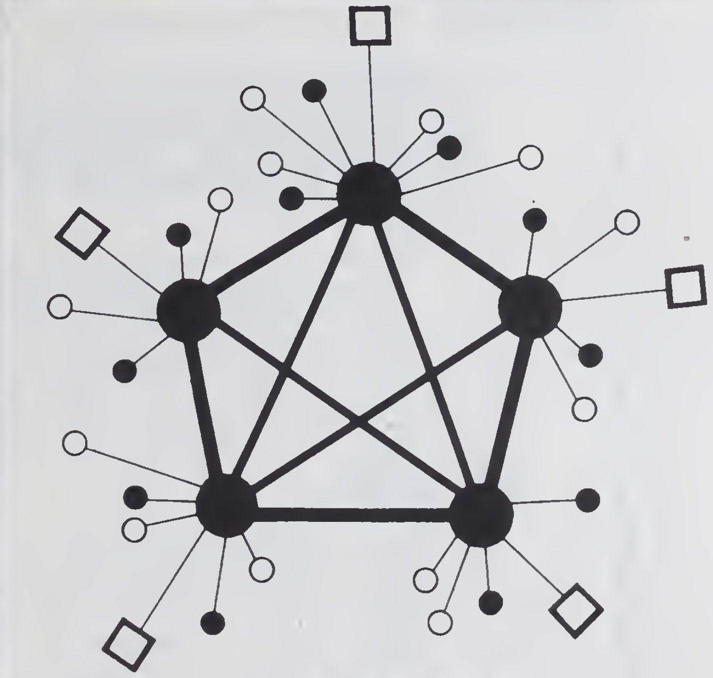

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COMPUTER OPERATIONS MANAGER — Posting No. 290A-80

The Position:

— To manage the computer hardware resource for the City of Edmonton.
— To provide for the management of a centralized/decentralized network of computers in diverse geographic locations.
— To provide the technical support functions in the area of operating systems and software support to the computer hardware.
— To provide input to the Master Plan from the viewpoint of the practicality of obtaining equipment and creating workable hardware configurations.

The Candidate:

— Degree in Computer Science or related area.
— 8 - 10 years progressively responsible experience in the supervision and management of a computer operations environment.

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The Position:

— To assume responsibility for the procurement, development, and management of the computer personnel resource in the City of Edmonton.
— To provide for the development of systems in a strong project management mode within firm time frames and cost estimates for systems projects.
— To procure management staff in the technical design, systems analysis and programming functions as well as resources from the private supply market in terms of sub-contract personnel.
— Projects range from a stand alone directory assistance application to Financial Information Systems and Property and Land Bank Systems.

The Candidate:

— Degree in Computer Science, Bachelor of Science, M.B.A., or related degree.
— 8 - 10 years experience in a strong project management environment.
— Well developed analytical and project management skills as well as skills in managing human resources.

COMPUTING POLICY, PLANNING AND RESEARCH MANAGER — Posting No. 291A-80

The Position:

— To assume responsibility for the major areas of strategic planning for the City of Edmonton computer resource.
— To assume responsibility for short and long term planning and coordination, development of policies and procedures relative to technical operations and systems development and management auditing in a high technology, rapidly changing environment.
— To assume responsibility for security of data, and development of technical libraries.
— To assume responsibility for data administration, quality assurance and standards.

The Candidate:

— Degree in Computer Science.
— 8 - 10 years progressively responsible experience including experience in line management.
— A Bachelor of Science degree and/or an M.B.A. with significant planning and forecasting skills will also be considered.

When applying, please quote applicable posting number.

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Susquehanna University is an undergraduate institution located in the Susquehanna Valley of Central Pennsylvania. It has an enrollment of approximately 1450 students and offers majors within the areas of Liberal Arts, Business, and Music. Seventy-five students currently major in Computer and Information Science. The Computer Center facilities include an Hewlett-Packard 3000 Computer.

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Design, code, implement computer programs; documentation project control; maintenance, development of medical records data base and reporting system. Requires a Bachelor's degree in Computer Science or related field plus two to three years experience in computer programming, or an Associate's degree in Computer Programming and four or more years of experience. Experience using RSTS/E BASIC PLUS, statistics, other PDR-11 helpful. Salary commensurate with experience. **Apply: UNIVERSITY OF LOUISVILLE, Health Sciences Personnel, 525 East Madison, Louisville, KY 40202, (502) 588-5821.** AN AFFIRMATIVE ACTION/EQUAL OPPORTUNITY EMPLOYER.

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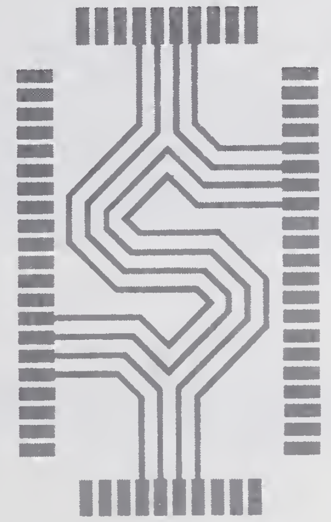

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- Participate in major upgrades to existing deposit systems.
- Utilize minicomputers for front end data capture.
- Develop new testing methodologies for large scale systems.

Loan Applications

- Support commercial, consumer and real estate lending functions throughout California.
- Develop new major systems in the real estate and commercial loan area using data base and on-line banking.
- Expand services available using structured methodologies for both the consumer lending and on-line collection functions.

Credit Card Applications

- Support both Visa® and Master Charge® accounts from authorization, inquiry and entry through cardholder and merchant accounting, collections and more.
- Develop and expand large scale batch and on-line systems.
- Work with small-scale applications using Bell and Howell, Burroughs, DEC, IBM and UNIVAC minis.

Branch Network Systems

- Support the research, design and development of on-line banking services delivered to customers and Bank of America California Branches.
- Develop IMS on-line application systems in the areas of Customer Account Inquiries, Administrative Message Services, Automated Tellers and other Electronic Banking Services.

Additional Applications

- Support the research, design and development of a wide variety of other applications including Personnel/Payroll, Stock Transfer, Lease Accounting, Trust Accounting and Money Transfers.

Our mainframe hardware consists of multiple IBM 370/3033's, OS/MVS, JES III, and a wide range of minicomputers for specialized services, distributive processing and communications applications.

Current knowledge and expertise with PANVALET, LIBRARIAN, EASYTRIEVE, MARK IV or equivalent is also desirable.

We offer competitive salaries and benefits, excellent training facilities, and the latest in system development methodologies (IMS FASTPATH, IBM 3800 Laser Printer, MAESTRO, TSO/SPF, MFS, BTS, etc.).

If you have the industry insight, technical background and desire to join our EBS group, please send your resume to Charles B. Smith, Manager, Recruitment Services, Bank of America, Dept. #3411-R, P.O. Box 37000, San Francisco, CA 94137. We are an equal opportunity employer.

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New Mexico Junior College is locally controlled, financially strong, and has experienced record enrollment this year. The college will serve during the 1979-80 year approximately the following clientele:

- 150 area vocational high school students,
- 1,450 fall credit students
- 9,000 non-credit continuing education students, and
- 20,000 community service participants.

A complete application consists of letter, resume, placement folder with transcripts, three or more letters of recommendation, and statement of applicant's community college and data processing/computer science philosophy. A nine-month salary range is $18,000-$21,000. The position begins August 18, 1980.

Send materials to:

John Shepherd
Vice President for Instructionaland Student Services
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Lovington Highway
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Will act as coordinator of the Systems Engineering Group. Experience in OR, Real Time Control, DBMS, Statistical Analysis, and Modeling. B.S. in Engineering, Math, or Computer Science. Supervisory experience required. MBA or MS preferred, but not essential.

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2. **APPLICATIONS PROGRAMMERS**
   To maintain and develop software required for the University's teaching effort. Applicants should have two years practical programming experience using FORTRAN and COBOL language systems. Experience of international packages in the statistics, information retrieval or financial modelling areas would be advantageous.

SALARY RANGE:	$17,826 - $20,322
CLOSING DATE:	11th April, 1980
POSITION NO.:	520

Informal enquiries mây be made to the Centre Director, Mr. Ian Ellis, telephone (ARMIDALE) 72 2911, extension 2287.

Interviews for the above positions will be held locally.

Applications, including the names and addresses of two referees and stating the Positon No. should be sent to the Staff Officer, the University of New England, Armidale, New South Wales, 2351, Australia, prior to the closing date.

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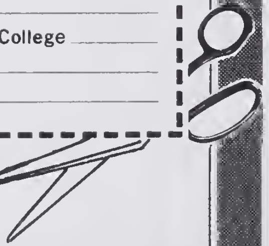

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REQUIREMENTS: Education — Undergraduate degree, preferably computer science-related. Master's an asset. Experience — in-depth with demonstrated EDP skills as a Director or #2 person in a health care industry environment, for example: a large hospital, group of hospitals, hospital service organization or other similar applications. Extensive telecommunications experience highly desirable.

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Expertise in FORTRAN, BASIC, COBOL, RPG II, Assembly Language, Systems Analysis and advanced courses.

Duties include teaching the above topics and at least two courses in mathematics. Ability to teach a course in Management Information Systems or Operations Management is desirable. Master's Degree is a minimum educational requirement. Preference given to candidates who have had some business and industrial experience and two or more years teaching experience. The appointment would be in the Business Program. The computing hardware consists of a PDP 11 with graphics terminal and IBM System III. Rank and salary negotiable depending on background and experience. starting date September 1, 1980. Applications close on March 31, 1980.

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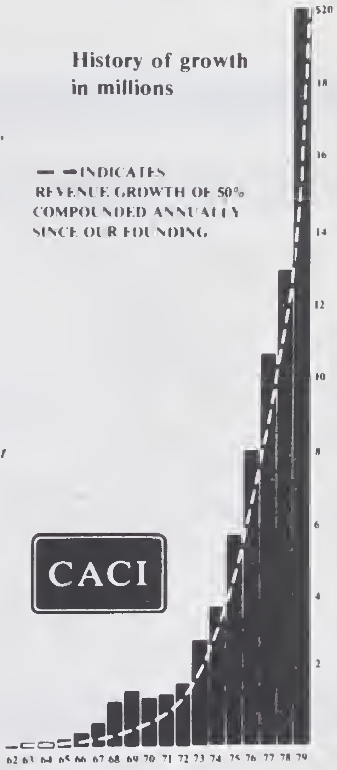

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3181 S.W. Sam Jackson Park Road
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New York State Legislature
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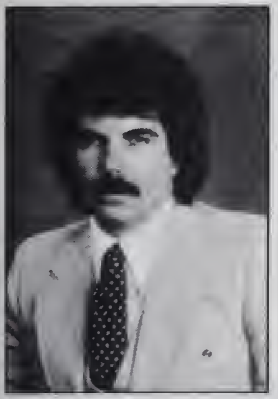

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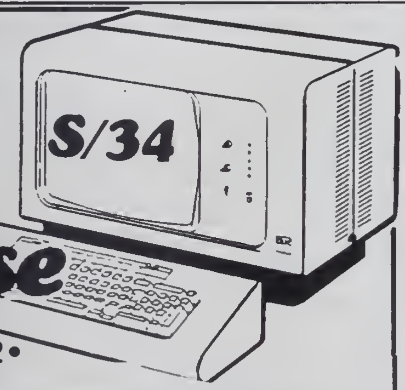

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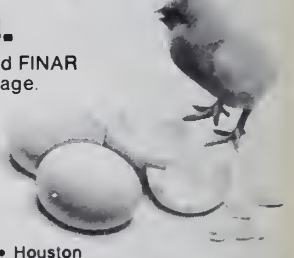

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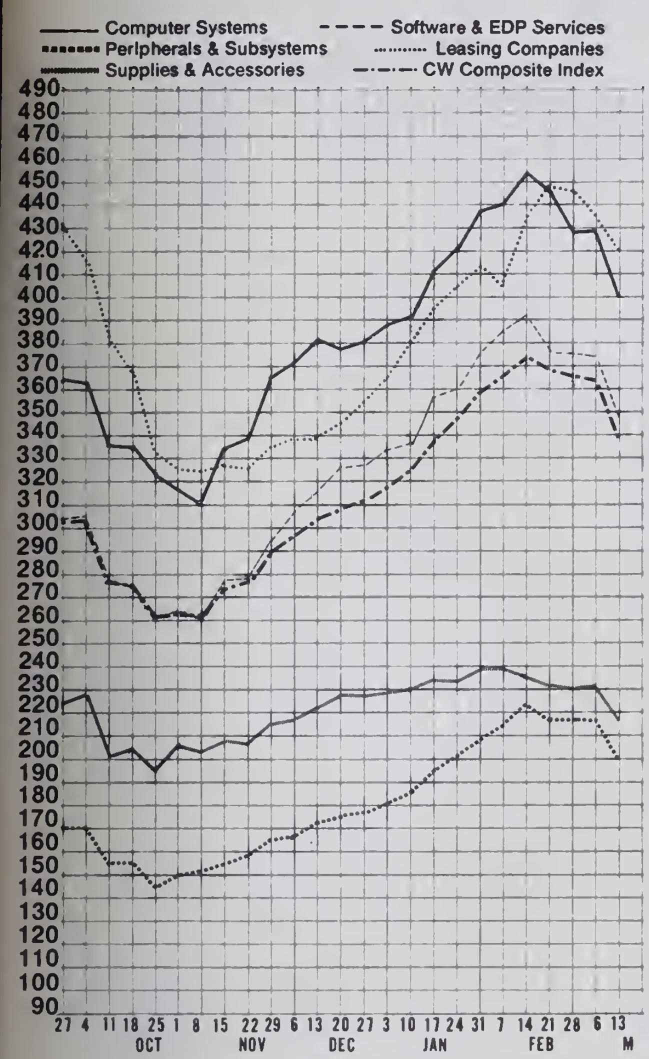

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TRADE·QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 12, 1980

All statistics compiled, computed and formatted by
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Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 12 1980	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	17- 69	23 5/8	-3 7/8	-14.0
N	BURROUGHS CORP	59- 87	69	-3 3/4	-5.1
O	COMPUTER AUTOMATION	9- 44	18	- 1/2	-2.7
N	CONTROL DATA CORP	23- 61	48 1/8	-6	-11.0
O	CRAY RESEARCH INC	8- 58	46	-4 1/4	-8.4
N	DATA GENERAL CORP	42- 74	64 7/8	-2 1/8	-3.1
N	DATAPOINT CORP	34-123	112 1/4	-5 3/4	-4.8
N	DIGITAL EQUIPMENT	39- 80	70 1/8	-3 5/8	-4.9
N	ELECTRONIC ASSOC.	2- 13	8 3/4	- 3/4	-7.8
A	ELECTRONIC ENGINEER.	9- 19	13 3/8	-1 7/8	-12.2
N	FOUR-PHASE SYSTEMS	19- 47	33	- 5/8	-1.8
N	FOXBORO	28- 44	35 3/4	-2 5/8	-6.8
O	GENERAL AUTOMATION	7- 26	13 5/8	-4 1/2	-24.8
O	GRI COMPUTER CORP	1- 3	5/8	0	0.0
N	HEWLETT-PACKARD CO	24- 70	63	-1 1/2	-2.3
N	HONEYWELL INC	43-100	87	-6 1/4	-6.7
N	IBM	61-321	61 3/8	-1 7/8	-2.9
N	MANAGEMENT ASSIST	9- 29	17 5/8	-2 1/8	-10.7
O	MANUFACTURING DATA S	9- 38	29 1/2	-3 1/4	-9.9
O	MINI-COMPUTER SYST	2- 8	3 3/8	- 5/8	-15.6
O	MODULAR COMPUTER SYS	7- 18	13 3/4	+1 3/4	+14.5
N	NCR	37- 81	73 7/8	-3	-3.9
N	PRIME COMPUTER INC	9- 32	29	-2 3/8	-7.5
N	PERKIN-ELMER	17- 47	40	-3 3/4	-8.5
N	SPERRY RAND	33- 60	51 1/2	-3	-5.5
A	SYSTEMS ENG. LABS	11- 24	18 1/8	-1 3/8	-7.0
O	TANDEM COMPUTERS INC	13- 54	45	-4	-8.1
N	TEXAS INSTRUMENTS	78-108	91	-5 3/8	-5.5
A	WANG LABS.	6- 40	36 1/8	-3 1/2	-8.8

LEASING COMPANIES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 12 1980	WEEK NET CHNGE	WEEK PCT CHNGE
O	BOOTHE FINANCIAL CP	13- 21	16 3/4	- 1/4	-1.4
O	COMDISCO INC	3- 21	10 7/8	-1 7/8	-14.7
A	COMMERCE GROUP CORP	1- 2	2 1/4	+ 1/2	+28.5
A	COMPUTER INVSTRS GRP	1- 7	2 3/8	- 5/8	-20.8
O	CONTINENTAL INFO SYS	3- 15	3	- 3/8	-11.1
M	DATRONIC RENTAL	1- 4	2 5/8	0	0.0
A	DCL INC	3- 6	5 3/8	+ 1/8	+2.3
N	DPF INC	6- 14	6 1/2	- 1/8	-1.8
N	ITEL	4- 36	3 5/8	- 1/8	-3.3
N	LEASCO CORP	24- 73	60	-3 1/4	-5.1
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	- 3/4	-21.4
N	U.S. LEASING	12- 20	12 7/8	+ 1/8	+0.9

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

SOFTWARE & EDP SERVICES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 12 1980	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/2	- 1/8	-7.6
O	ANACOMP INC	8- 24	14 1/2	-2 3/4	-15.9
O	ANALYSTS INTL CORP	3- 6	5 1/4	0	0.0
A	APPLIED DATA RES.	8- 17	10 1/8	- 3/4	-6.8
N	AUTOMATIC DATA PROC	24- 40	32 3/4	-1 7/8	-5.4
O	COMPU-SERV NETWORK	5- 19	18 1/4	- 1/4	-1.3
O	COMPUTER HORIZONS	1- 9	4	0	0.0
O	COMPUTER NETWORK	5- 16	5 3/8	- 7/8	-14.0
N	COMPUTER SCIENCES	8- 24	18 7/8	-1 3/8	-6.7
O	COMPUTER TASK GROUP	1- 9	7 1/2	- 3/4	-9.0
O	COMPUTER USAGE	2- 5	3 3/8	- 5/8	-15.6
O	COMPUT AUTO REP SVC	4- 10	5	0	0.0
O	COMSHARE	6- 26	17	- 3/4	-4.2
O	CULLINANE CORP	14- 34	33	+ 1/2	+1.5
O	DATA DIMENSIONS INC	1- 9	1 5/8	0	0.0
O	DATATAB	1- 4	1 1/8	- 1/8	-10.0
O	DSI CORP	4- 9	7	- 1/4	-3.4
N	ELECTRONIC DATA SYST	15- 28	22 1/4	-2	-8.2
O	INFORMATICS INC	9- 22	15 1/2	-1	-6.0
O	INSYTE CORP	1- 3	1 3/8	- 1/4	-15.3
O	IPS COMPUTER MARKET.	2- 3	3 1/2	0	0.0
O	KEANE ASSOCIATES	3- 9	8 1/2	0	0.0
O	KEYDATA CORP	1- 5	2 3/4	- 3/4	-21.4
A	LOGICON	10- 23	18	-2 5/8	-12.7
O	NATIONAL DATA CORP	7- 19	18	- 1/2	-2.7
N	PLANNING RESEARCH	4- 10	7	-1	-12.5
O	PROGRAMMED TAX SYSTS	3- 5	4 3/4	0	0.0
O	PROGRAMMING & SYS	1- 1	3/4	- 1/8	-20.0
O	RAPIDATA INC	3- 7	5	+ 1/8	+2.5
O	REYNOLDS & REYNOLD	18- 36	28 1/2	-2	-6.5
O	SCIENTIFIC COMPUTERS	3- 16	11 1/2	-2 1/2	-17.8
N	TYMSHARE INC	18- 58	49 1/4	-6 1/2	-11.6
A	URS SYSTEMS	5- 12	10 5/8	- 5/8	-5.5
N	WYLY CORP	1- 9	8 5/8	+ 1/2	+6.1

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 12 1980	WEEK NET CHNGE	WEEK PCT CHNGE
N	AM INTERNATIONAL	13- 32	17 1/2	- 3/4	-4.1
N	AMPEX CORP	10- 29	24 3/8	- 5/8	-2.5
A	ANDERSON JACOBSON	5- 16	11 3/4	-2 1/2	-17.5
N	APPLIED DIG DATA SYS	6- 22	7	- 3/4	-9.6
O	AUTO-TROL TECHNOLOGY	14- 39	31 1/2	-2 1/2	-7.3
O	BEEHIVE INT'L	3- 8	5 1/2	-2	-26.6
A	BOLT.BERANEK & NEW	6- 22	18	-1 5/8	-8.2
N	BUNKER-RAMO	10- 32	25 3/4	-3 1/4	-11.2
O	CAMBRIDGE MEMORIES	1- 9	1 7/8	- 1/4	-11.7
O	COMPUTER DEVICES INC	5- 9	6 1/2	- 1/2	-7.1
N	CENTRONICS DATA COMP	16- 54	41 3/4	+ 3/8	+0.9
O	COGNITRONICS	1- 4	2 5/8	0	0.0
O	COMPUTER COMMUN.	6- 10	5 1/8	- 1/8	-2.3
O	COMPUTER CONSOLES	4- 29	25 3/4	-2 3/4	-9.6
A	COMPUTER EQUIPMENT	3- 7	5 3/4	-1 1/8	-16.3
O	COMPUTER TRANSCEIVER	1- 5	2 5/8	- 1/8	-4.5
O	COMPUTERVISION CORP	5- 58	50 1/4	-4	-7.3
N	CONRAC CORP	13- 26	19 1/4	-1 1/2	-7.2
A	DATA ACCESS SYSTEMS	0- 14	11 3/4	- 3/4	-6.0
A	DATA PRODUCTS CORP	13- 25	17 7/8	-1 1/8	-5.9
O	DATUM INC	2- 6	2 3/4	- 1/8	-4.3
O	DECISION DATA COMPUT	2- 6	2 1/4	- 3/8	-14.2
O	DELTA DATA SYSTEMS	1- 3	1 7/8	- 1/2	-21.0
N	DOCUMATION INC	6- 34	12 5/8	- 3/4	-5.6
O	DATARAM CORP	6- 36	28	-4 1/4	-13.1
N	ELECTRONIC M & M	3- 9	4 3/4	- 1/8	-2.5
O	EVANS & SUTHERLAND	20- 52	51	+1	+2.0
O	FABRI-TEK	1- 2	2 1/8	+ 1/4	+13.3
O	GENERAL COMPUTER SYS	1- 3	2 3/8	0	0.0
O	GENERAL DATACOMM IND	9- 24	15 3/4	-1 1/2	-8.6
N	HAZELTINE CORP	10- 29	23 3/8	- 5/8	-2.6
N	HARRIS CORP	17- 39	32 1/2	-2 3/8	-6.8
O	INFOREX INC	1- 11	1 3/8	- 1/8	-8.3
O	INFORMATION INTL INC	7- 15	10 3/4	-1 1/4	-10.4
O	INFOTON	1- 4	2 1/2	0	0.0
O	INTEL CORP	26- 75	67 1/4	-3 1/4	-4.6
O	INTERSIL	7- 32	23	-2 3/4	-10.6
A	LUNDY ELECTRONICS	4- 11	8 1/2	-1	-10.5
O	MSI DATA CORP	6- 19	7 1/4	-1 5/8	-18.3
N	MEMOREX	14- 59	14	-1 1/2	-9.6
N	MOHAWK DATA SCI	6- 20	16 1/2	-1 3/4	-9.5
O	OMEX	2- 10	10	0	0.0
O	PARADYNE CORP	9- 36	30 3/4	-4 1/2	-12.7
A	PENRIL CORP	5- 15	10 7/8	-1 1/8	-9.3
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	RAMTEK CORP	7- 17	14 3/4	- 7/8	-5.5
O	RECOGNITION EQUIP	5- 13	7 3/8	-1	-11.9
O	SCAN DATA	1- 5	2	- 3/8	-15.7
N	STORAGE TECHNOLOGY	14- 46	17 5/8	-1 1/8	-6.0
O	SYKES DATATRONICS	4- 31	19	-11 3/4	-38.2
O	T BAR INC	11- 28	26 1/4	- 3/4	-2.7
A	TEC INC	4- 13	4 1/2	- 5/8	-12.1
N	TEKTRONIX INC	33- 64	50 1/2	-2 1/2	-4.7
N	TELEX	3- 9	3 5/8	- 3/8	-9.3
O	TESDATA SYSTEMS CP	8- 26	12 1/2	- 7/8	-6.5
O	TIMEPLEX INC	4- 14	11 3/4	- 3/4	-6.0
O	WILTEK INC	1- 2	1 1/4	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1979-80 RANGE (1)	CLOSE MAR 12 1980	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 12	9 3/4	- 1/2	-4.8
O	BALTIMORE BUS FORMS	1- 4	1	0	0.0
N	BARRY WRIGHT	14- 34	23 1/4	-1 1/2	-6.0
O	CYBERMATICS INC	1- 1	1	0	0.0
O	DUPLEX PRODUCTS INC	13- 31	23 7/8	-2 3/8	-9.0
N	ENNIS BUS. FORMS	5- 21	15 1/8	- 1/8	-0.8
N	3M COMPANY	43- 66	47 3/4	-1 3/4	-3.5
O	MOORE CORP LTD	26- 34	29 3/4	-3	-9.4
N	NASHUA CORP	18- 37	23 1/8	-3 5/8	-13.5
O	STANDARD REGISTER	20- 29	26	-2	-7.1
A	TAB PRODUCTS CO	8- 22	18 1/4	-1 5/8	-8.1
A	WABASH MAGNETICS	10- 22	13 3/8	- 7/8	-6.1
N	WALLACE BUS FORMS	18- 33	26 1/8	-2 1/2	-8.7

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